THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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SYNTHETIC RUBBER.

THE uses to which rubber and its congener gutta-percha are put in the electrical industry are so important and numerous, that any circumstances making for the development of the supply or cheapening the cost of production of either or both of these substances, must be regarded as of the highest importance to the welfare of its various branches. Rubber, as we all know, is used in its soft form very largely in light and power cables, and partly in the vulcanised form, partly in the unvulcanised state as an insulator and protective agent in flexible strip. In its hard form, *i.e.*, ebonite, it is used very largely for switchboards, for accumulator cases, and so on. It is difficult to form any reliable estimate of the actual value of the rubber employed in the British electrical industries, but we know that during the year 1910 the value of electrical wires and cables of various kinds exported from this country was not far short of three millions sterling. These figures, of course, include gutta-percha covered, *i.e.*, submarine cables; but, on the other hand, there can be little doubt that the exported cables, &c., form only a small proportion of the goods turned out by the electrical industry in this country, in which rubber or gutta-percha plays a prominent part. A somewhat better idea of the importance of the rubber supply to the United Kingdom may be gathered from the fact that during the past two years the consumption has been something like 20,000 tons, of a value approximating to 10 millions sterling. With regard to gutta-percha a recent estimate places the amount in cables actually laid at well over 20,000 tons. In view of these facts it is not a matter for surprise that the paper recently read before the Society of Chemical Industry by Prof. W. H. Perkin, F.R.S., on synthetic or chemically-prepared rubber should have caused the greatest interest, an interest not untinged with excitement and sensation among the widest circles. Prof. Perkin's paper was actually entitled "The Production and Polymerisation of Isoprene and its Homologues," and essentially consisted of an historical review of the attempts to make rubber artificially, followed by an account of the work conducted by an organisation of chemists directed by Messrs. Strange and Graham, working in conjunction with Prof. Perkin and later with Prof. Fernbach, of the Pasteur Institute, Paris. Prior to the advent of Prof. Fernbach on the scene Sir William Ramsay had already become associated with the group as consultant. The history of synthetic rubber may be said to have started with the discovery by an Englishman, namely, Greville Williams, in 1860, of the fact that among the products obtained by the dry distillation of rubber was a substance, subsequently termed isoprene, which on standing in a sealed vessel thickened and became viscous. In 1875 Bouchardat, of Paris, discovered that by the action of hydrochloric acid on isoprene (also obtained from rubber), a substance which closely

resembled natural rubber could be obtained. Subsequently Prof. Tilden found that isoprene could be derived not only from rubber, but from another natural product—namely, turpentine—by passing this substance through a heated tube under certain conditions, and from the isoprene so prepared Prof. Tilden was able by two processes to obtain a material, the qualities of which appeared to be much the same as those of natural rubber. The next step was to clear up the constitution of the material isoprene, and, to pass over all the intermediary stages, it may be stated that this substance has been proved to be a methyl-butadiene—that is to say, a chain compound containing five carbon atoms and two double linkages. For a time the views of Tilden regarding the basis substances of natural rubber were strenuously combatted by a German school of chemists, headed by Prof. Harries, and the failure of Harries to obtain rubber from isoprene as described by Tilden led him to express a serious doubt as to whether Tilden had not been wrong in his observations, or had not drawn wrong deductions from his experiments. Not the least interesting part of Prof. Perkin's discourse consisted in the production of some of the original specimens of the rubber-like material prepared by Prof. Tilden, and the refutation of the claims of the chemists of the German school to the effect that they were the original and true discoverers of the synthesis of rubber. That isoprene can be converted into rubber is now acknowledged by the German school, inasmuch as recent researches have enabled them to convert this material into the substance in question. There can be no doubt, in view of the evidence brought forward by Prof. Perkin, that the credit of the original discovery of a method of synthesising rubber lies to the credit of this country, and a further triumph of British science lies in the fact that it is an Englishman—namely, Dr. Matthews, the chief of the organisation of chemists working under the direction of Messrs. Strange and Graham—who may claim priority for a method of converting isoprene rapidly and surely into a rubber. At this point it may be explained that, from a commercial point of view, the difficulties associated with the production of rubber consist, first, in the problem of producing isoprene cheaply, and secondly, in the problem of devising a rapid and approximately quantitative method for converting this material. The latter problem appears to have been adequately solved, inasmuch as Dr. Matthews has discovered that if isoprene is left in contact with metallic sodium in a closed vessel, it rapidly loses its limpidity, becomes highly viscid, and is ultimately converted, almost without loss, into a rubber. We advisedly say "a rubber," because it would appear from the publications of Prof. Harries, who, independently, but later, it would appear, than Dr. Matthews discovered this method of conversion, that the rubbers obtained either from isoprene or from its higher or lower homologues by the sodium process differ appreciably in regard to their chemical and physical properties from natural rubbers, at any rate from rubbers of the Para or plantation type. A process for the production of isoprene cheaply does not yet appear to have been worked out. Prof. Perkin and his colleagues rightly started with the basis idea that a synthetic process which should prove to be commercially successful must necessarily be based on a raw material cheap in price and practically unlimited in supply, and in this connection they took into consideration wood, petroleum, coal and starch. The three first-named materials failing to give any promising result, it was suggested that the last-named substance, starch, might by a suitable process of fermentation be converted into a type of fusel oil, namely iso-amylic alcohol, which in its turn offered the possibility of conversion by fairly simple methods into isoprene. Iso-amylic alcohol has actually been converted first of all into its chloride and by further chlorination into a di-chloro derivative, and finally by the removal of two molecules of hydrochloric acid by means of soda lime, into isoprene, but unfortunately the process of fermentation on which Prof. Fernbach has, according to reports, been working for the last eighteen months, has not yet produced iso-amylic alcohol on a commercial basis. In the course of his labours, however, Prof. Fernbach discovered that starch could be readily converted with a high yield into a lower homologue of the desired alcohol, namely, into a butyl alcohol. From butyl alcohol it is stated that butadiene, that is to say, a straight chain compound containing four carbon atoms, or, to put it in other words, an isoprene in which the methyl group has been replaced by hydrogen, can readily be obtained with a good yield. Meanwhile it was well known that butadiene as well as the higher homologues of isoprene could be converted similarly to the latter body into rubber-like substances, and according to the views of Prof. Harries and others, the rubbers so obtained offer much promise. In connection with Prof. Fernbach's process for the production of butyl alcohol, we are informed that a process by which acetone can be produced at about one-third of its present price has been discovered, and there can be very little doubt that even though the hopes which have been founded by Prof. Perkin and his colleagues on the production of rubber commercially from starch may not be fulfilled, they should be amply rewarded for their labours by the results which will undoubtedly accrue if acetone and fusel oil can actually be produced on a very large scale and at the price which is anticipated. Acetone at present is produced solely from wood, and owing to the rapidly-increasing demand the price of this material has risen steadily within the last few years from about £40 to £90 per ton. It is essential to the manufacture of modern high-power explosives, and it is used on a very large scale indeed as a solvent in other industries, and would be still more largely employed were its price not rapidly becoming prohibitive. With regard to the possibility of the commercial production of a synthetic rubber, either of the normal rubber derived from isoprene, or of the new butadiene rubber, it is acknowledged that the matter is still in the laboratory stage, and there can be little doubt that so far, particularly in view of the small quantities of these materials which have been produced, there is very little, if any, practical experience of a satisfactory character to guide us in forming an opinion as to how the material will behave during the manufacturing process or afterwards. Prof. Perkin and his colleagues have expressed the view that they may in time produce a synthetic rubber with the probability of a profit at a selling price of 2s. 6d. per lb., and the possibility of a production at 1s. per lb. We are admittedly then still dealing with probabilities and possibilities, and it is interesting to note in this connection that the leading chemist of one of the great German organisations, which has occupied itself very largely with the synthetic rubber problem, has this year said that progress is very slow, and has lent point to this statement by saying that if the chemical industry were but given the 36 years' start which the plantation rubber industry possesses in this connection, he has very little doubt that it would be shown that synthetic rubber would make for itself, *side by side* with plantation rubber, a place in the world's industrial markets. The electrical industry then will view with interest and sympathy the efforts of chemists in the continuation of a struggle, which, if carried to a successful issue by them, must lead to a cheapening and broadening of the world's rubber supplies; but meanwhile the wild rumours circulating as to the approaching downfall of the plantation industry, not to speak of wild rubber, need not be given more credence than they deserve.

Australian Views on Electrical Development.

MR. H. R. HARPER, City Electrical Engineer of Melbourne, has recently published a very complete report to the City Council dealing with his official tour in the States, Great Britain, France and Germany, and we trust that electrical developments in Melbourne will receive considerable impetus from the recommendations and criticisms presented.

The chief impression gained in France seems to have concerned the "rather chaotic" state of electricity supply in Paris, but there are hopes that a homogeneous system will gradually be attained. England, Germany and the States

all receive generous praise. The L.C.C. Tramways are justly considered the finest in the world, but we are rather sorry to note that Mr. Harper has been persuaded to believe that the conduit system is the one best adapted to Melbourne's requirements. That city is one of the few remaining places in the world where cable tramways are in vogue. Mr. Harper gives figures relating to the surplus on working of the L.C.C. trams, but the prospect is not by any means so pleasing as he suggests; a statement published on another page of this issue shows that the margin of net surplus is far short of what it ought to be when the capital outlay is taken into account. The equipment of the Berliner Electricitätswerke (the company supplying the whole of the electric lighting, power and tramways in Berlin) is stated to be the most up-to-date and complete on the Continent, and the report describes Berlin as the best lighted city in the world (both as regards interiors and streets), and emphasises the great field for illuminating engineers in the Victorian capital.

The history of electricity supply in America is a tale of private enterprise and gradual consolidation of competing interests into gigantic monopolies. Municipal enterprise is practically confined to small street lighting installations and to the collection of a percentage of the receipts of private supply companies. Mr. Harper speaks favourably of the system of State control of public utilities in the U.S.A., and is especially warm in his praise of the commercial organisation of American undertakings which enables them to supply at rates which would be prohibitive in any other country. Our power rates, in particular, compare favourably with those in the States.

Considerable space in the report is devoted to a consideration of our tariff systems for domestic supply and of the question of municipal trading. While mainly confining his remarks to a statement of facts, Mr. Harper appears to approve of our new tariff scales, and to support the policy of municipal trading. Favourable mention is made of trolley 'buses, and special attention is called to the extraordinary development of electric road vehicles in the States. Chicago alone has 3,000 of various types in use; electric vehicles are to be used exclusively in the New York Fire Brigade, and the Berlin postal authorities have ordered 750 electric wagons for departmental use. But we blush for Old England in this particular.

The Sheffield Corporation and its Wiring Department.

It will be remembered that on February 23rd of this year Mr. Justice Eve delivered judgment in the case of the Attorney-General *v.* the Corporation of Sheffield. This was a suit brought against the Corporation by the electrical contractors, with the object of putting a stop to the wiring and installing of fittings for lighting, bells, telephones, and all apparatus except motors and heating devices. The Corporation, under its Act of 1903, has power to sell, install, fix, and repair motors and heating apparatus, but not to manufacture them. Before 1898 the Sheffield Electric Light and Power Co., Ltd., had carried on an extensive business, both within and beyond the area covered by their provisional order authorising the supply of electricity. In that year the Corporation bought up the company, and it has continued to carry on the wiring and fittings business down to the present time. The Corporation very naturally claimed that, having bought the business, and having obtained Parliamentary authority for the raising of the necessary capital, it was entitled to carry it on. The contractors, on the other hand, thought the contrary, since the wiring department seems not to have been expressly mentioned in the Act authorising the transfer. The judgment was in favour of the contractors, and notice of appeal was given by the Corporation. So much is public knowledge, but we have thought it well to summarise briefly the history of the matter.

The Corporation, at the time of the trial, had either presented or was about to present a Bill to Parliament seeking authority to legalise completely the work of the wiring department. This was known to the judge, and was mentioned in Court. An undertaking was given by the Corporation that it would not carry the appeal further if it were successful in Parliament.

So the matter stood, until Thursday of last week. On that day, a Committee of the House of Commons, presided over by Sir Henry Kimber, passed the wiring clauses of the Bill without alteration or deletion of any kind. The Chamber of Commerce opposed the clauses, and submitted resolutions condemning them. On the facts and figures put before the Committee the latter came to the conclusion that it would have been very hard upon the Corporation to have refused the powers which it was seeking, and which it has—illegally, as at present decided—been exercising for the past 14 years.

Our views upon municipal wiring are well-known to our readers, and they have not changed. When it is possible, it is better to work with the contractors. The contractors in Sheffield complain that the existence of the Corporation's wiring department makes it impossible for them to obtain business. The Corporation's view is that, but for the existence of that department, it would not have had the supply business which is now connected; or, at any rate, that it would have been very much less. We will not theorise over this matter. It is quite impossible to say what would have happened if the circumstances had been fundamentally different.

When the news became known in Harrogate, where the I.M.E.A. Convention was in progress, it naturally created considerable discussion, and the view was expressed by some that it would now be difficult for Parliament to refuse to other municipalities the powers which it now seems willing to grant to Sheffield. We cannot find any grounds for this view. Sheffield is a special case, and must be regarded as such. There is not another municipality in the United Kingdom to which the Sheffield arguments apply, and if other Corporations want wiring powers they must seek them for themselves, either jointly or severally, and prove their own claims to be valid in each case. Moreover, we very much doubt whether, even in the case of Sheffield, the Bill will ever win through the later stages and become an Act of Parliament.

As we have often said before, we do most earnestly hope that the end of these too-long existing quarrels between municipalities and contractors will come soon. There must be—there is—room for agreement, and we once more commend the suggestion to the attention of the bodies concerned, that they should, with the co-operation of the Institution, and possibly also of the B.E.A.M.A., endeavour to bring about that agreement.

Our Electricity Works Table.

We are publishing with this issue our table of statistics relating to the electricity works of the United Kingdom, and trust that it will be found of use to our readers. Barely a dozen new stations have been added to the list since its last appearance, two years ago, and several names have been removed owing to absorption by larger concerns; nevertheless, the total is now over 460, and the sheet has attained to dimensions somewhat unwieldy. Our thanks are again due to the many engineers and managers who have assisted us in revising the data—a task which, we know, is at all times distasteful, and therefore all the more thankworthy.

Amongst the features which have been impressed upon us in producing the table are the great progress of the tungsten lamp in street lighting, the general recovery from its effect on the private lighting output, the continued expansion of the motor load, and the amazing variety of tariffs offered to the consumer. The tariffs, in some cases, are so diversified that they cannot possibly be briefly summarised. The modern tendency towards concentration is also noteworthy, and, in our opinion, most salutary. In many cases small and therefore uneconomical generating stations have become distributing sub-stations, and there is no doubt that great benefit will be derived by the community from the continued operation of this process.

THE I.M.E.A. CONVENTION, 1912.

THE Harrogate Convention, to the opening of which we referred last week, came to a conclusion on Friday last, when many of those who had been living the strenuous life indicated by the official programme enjoyed some relaxation, in the form of an afternoon visit to Studley Royal and Fountains Abbey.

The earlier proceedings have already been briefly summarised in our pages, but writing after the event, it seems necessary in view of the importance of electrical cooking to all concerned and the great diversity of opinion—favourable and unfavourable—held by central station engineers, that joint action in some form or another should be taken to establish the position of the electric cooker once and for all.

The means for disseminating information already exist, but apparently many engineers are still in ignorance of the doings of their more progressive *confrères*, of the progress made by manufacturers of apparatus and of the results obtained by users in different parts of the country. The misdeeds of some of the early apparatus still live, and it seems evident that in many cases the engineer as well as the consumer can profitably receive attention at the hands of those who are developing this important branch of supply work.

Wednesday's proceedings in Leeds included, after the morning's business, afternoon visits to both the electricity supply and tramway departments' stations and an inspection of the Leeds railless traction system (which was described recently in our pages), and concluded with the annual dinner at the Hotel Majestic, Harrogate, in the evening.

Some 300 of the members and visitors attended this function, which produced a wealth of speech-making of a more than usually interesting kind. Mr. S. Z. de Ferranti, who proposed the toast of the evening, indicated his agreement with the President as to the future of large electricity stations, and with much of the Bill which the Association was promoting in Parliament to secure additional powers, but he urged the necessity for promoting more friendly relations between the municipal and privately owned supply interests, and those engaged in the manufacturing and contracting business. The smaller undertakings were at a disadvantage in supply work, and Mr. Ferranti suggested as a way out of the difficulty, co-operation between municipal authorities and a general supply company, in which they would be shareholders in the ordinary way. In this way the advantages of modern business organisation and a large and cheap output could be secured.

Mr. H. Richardson (Dundee), who proposed "The Guests," and delighted the numerous ladies present, drew a delightfully humorous speech from Mr. H. E. Blain (West Ham) in response.

A short musical programme followed the speeches, and subsequently many of those present adjourned for dancing.

The busiest day of the Convention was Thursday, which commenced with an early journey to Middlesbrough, where, in the Town Hall, a welcome by the Mayor, Councillor Harkness, awaited the visitors. The morning was given up to the discussion of automatic pressure regulation, a subject introduced by Mr. S. J. Watson, of Bury.

Automatic regulation of bus-bar pressure has, of course, become familiar, and obviously the regulation of pressure at feeding points and places distant from the station is a logical development, to which many speakers drew attention. The subject has been ventilated at the Institution of Electrical Engineers recently, but its inclusion in Thursday's proceedings was peculiarly appropriate in view of the success which has attended the Taylor-Scotson regulator introduced by Mr. H. M. Taylor, the borough electrical engineer.

At the conclusion of the discussion, the visitors adjourned to the crypt of the town hall for luncheon at the invitation of the Corporation. The afternoon was spent in visits to some of the iron and steel works for which Tees-side is famous, a short trip on the river to Teesmouth and back, and a brief inspection of the Middlesbrough transporter bridge, which was opened towards the end of last year.

Much might be written in regard to these visits, but it must suffice to say that at Messrs. Samuelson's works, the Newport turbine station of the Cleveland and Durham Power Co., which operates on the surplus steam from blowing engines and boilers, was shown to the visitors. This installation includes some 6,000 KW. of Westinghouse, Willans and Brush plant, and forms one of the chain of eight power plants, having a combined capacity of 28,000 KW., and all utilising some waste heat, which are operated by the Cleveland and Durham Co., in conjunction with its 69 substations and 140 miles of transmission line.

A brief inspection of the modern turbine and older reciprocating blowing plant was also made, and later Messrs. Dorman, Long's power house and electrically-driven rolling mills claimed the attention of the visitors. The power station contains four 1,200-KW. A.E.G. turbo-alternators, together with motor-generators and a remarkably fine switchboard, and operates on both live and exhaust steam from rolling-mill engines. Two large electrically-driven reversing rolling mills, equipped by the B.T.-H. Co. and A.E.G. respectively, and one of the continuous type equipped by the Westinghouse Co., are in use in these works, where the visitors were able to compare, so far as a brief inspection permitted, their performance with that of adjoining steam-driven rolling mills.

The spectacle of a mill motor reversing with from 8,000 to 11,000 amperes, three or four times a minute with practically sparkless commutation is a sight worth seeing, which well repaid the fatigues of the afternoon's pilgrimage.

In addition to the above the waste-heat power station of the Cargo Fleet Iron Co., where several types of gas engine are in use, was shown to another party of the visitors, as also the electrically-driven rolling mill of the Ormesby Rolling Mill Co., which was equipped by Messrs. Siemens, while some members visited the Westgarth-Diesel engined ship which is being completed on the Tees.

Tees-side, and indeed the whole of the North-East Coast, abounds in subjects of interest to the electrical engineer, and the day left us with the reflection that a more extended visit would be both profitable and welcome to the majority of central station men.

For those less energetically inclined, an alternative visit to York was provided, where the historic features of the old city, the Corporation Electricity Works, &c., and Messrs. Rowntree's Cocoa Works claimed attention.

The last day's business of the Convention was confined to the annual general meeting, at which the first item is the election of officers and council for the ensuing year.

As the result of the voting the executive for 1912-13 is as follows :—

President.—C. E. C. Shawfield, Wolverhampton.
Vice-Presidents.—R. A. Chattock, Birmingham; H. Richardson, Dundee.
Past Presidents.—W. W. Lackie, Glasgow; J. Christie, Brighton; G. Wilkinson, Harrogate.
Hon. Solicitor.—Alderman G. Pearson, Bristol.
Hon. Treasurer.—J. E. Edgcome (Past Pres.), Kingston-upon-Thames.
Hon. Secretary.—H. Faraday Proctor (Past Pres.), Bristol.
Council.—F. Ayton, Ipswich; Alderman Bruce, Sunderland; A. C. Cramb, Croydon; Councillor Crowther, Sheffield; C. Furness, Blackpool; Councillor Gibson, Wolverhampton; F. M. Long, Norwich; S. L. Pearce, Manchester; *Councillor Sinclair, Swansea; A. H. Seabrook, Marylebone; S. J. Watson, Bury; Alderman Smith, Barrow; Bailie Willock, Glasgow; * T. Roles, Bradford.

* Take office for one year.

Mr. Shawfield's election as president was received with acclamation, and it was subsequently decided, in view of all the circumstances, to hold the next Convention in London, which was last visited some six years ago.

Mr. W. G. Pickvance (Wrexham) raised the question of the representation of the smaller undertakings on the Council, which he brought forward, without tangible result, the year before, and other speakers drew attention to what they considered was the unsatisfactory method of conducting the election of officers.

Mr. A. S. Blackman (Sunderland) urged the advantages of securing more frequent changes in the Council executive, and, after some discussion, a resolution was agreed to which it is intended shall secure that engineer members of Council shall not serve more than two consecutive periods of two years, and shall then be ineligible for re-election for a year.

Discussion then took place on a recommendation in the report which proposed to secure half a day for a meeting of engineer members only, for the consideration of any subject

which, one supposes, would not bear the light of publicity. This proposal naturally raised the ire of certain Councillor members of the Association, and, after much explanation, it was agreed to modify the proposal in their favour.

Mr. Hoadley (Maidstone) then asked exactly how "the Bill" stood, and on the President intimating the desirability of discussing the matter in private, the Press representatives withdrew.

[The "Further Powers" Bill promoted by the Association was, as a matter of fact, abandoned the day prior to the opening of the Convention, after having passed through the initial stages; this was mentioned in our last issue.]

The report and accounts, which were passed, show that the membership of the Association stands at 388, a decrease of 11 on the previous year, and that the surplus funds in hand amount to £663. The report mentions, among other matters, that a scheme for the permanent establishment of the publicity organisation has been prepared, which, it is hoped, will receive adequate support from those most concerned; also that the Council's efforts to form an information bureau met with but a half-hearted response.

The question of amending the Board of Trade form of accounts has received the attention of the Council, as also the Model General Conditions for Contracts, which we gather the B.E.A.M.A. are desirous of considerably modifying.

The Convention, as a whole, passed off very smoothly, Harrogate, indeed, being more noted for its health-giving attributes than for its amusements. While we know not the effect of the strong and mild sulphur waters, the magnesia, Kissingen, Alexandra Chalybeate and others upon the visitors, the Harrogate firewaters apparently developed strange doings in more than one quarter, but then these liquids are neither diuretic nor alterative, hence their wayward and unexpected results to the consumer.

In conclusion, it is only just that we should say a few words in praise of the Grand Hotel, which we found replete with every comfort. The architect who designed it had an eye to both elegance and convenience, and every nook and corner shows the true artist. The gardens are beautiful, as, indeed, is the case throughout Harrogate and its hotels.

Electric Cooking and Electric Cooking Apparatus.

By H. H. Holmes, Sales Manager, Borough of St. Marylebone Electric Supply.

(*Abstract.*)

If every household now using electric light were to use electric cooking as well, the consumption per house would be increased by at least 400 per cent. The reductions per unit in working costs and capital charges which such an increase of load would permit would be enormously to the advantage of electric supply undertakings in particular, and the community in general.

The cooking outfit which consists of separately heated utensils is not suitable for domestic purposes, because the housewife or cook will not put up with a set of apparatus clumsy to handle, expensive to repair, difficult to clean, and which is not fool proof. The gas cooker has created a standard of convenience and usefulness to which the public has become accustomed, and the designer of the popular electric cooker cannot do better than to follow generally for the present along the same lines.

The average family now using electric light, and likely to use electric cooking, will consist of, including servants, say, seven persons, but the cooker installed must be sufficiently large to cook for, say, 16 persons.

The outfit, which should be of similar shape to a gas cooker, would have a top plate containing three boiling plates and one grill. The top plate should be at least 30 in. wide × 24 in. deep. Plenty of room is a convenience which the cook appreciates. Two boiling plates—the number generally provided—are not sufficient even in a smaller cooker. The grill should provide a cooking space 12 in. long × 9 in. wide, at least. The pan and grid underneath the grill should be at least as large as the cooking space.

The size (cooking space) of the oven should be 22 in. high × 14 in. deep × 15½ in. wide, or the equivalent in cubical contents.

In addition to the above, a separate rapid water boiler should be provided, which will boil 2 pints of water in not more than 4 minutes. This separate water boiler is absolutely necessary if the cooker is to be popular. One of the greatest recommendations of the gas cooker is the quickness with which it will boil water, and the electric cooker must provide the same convenience.

The space between the oven and the top plate should be boxed in except at the front. The waste heat from the oven, grill, boiling and hot plates, will provide sufficient heat in this enclosed space for plate warming.

The type of boiling plate now almost universal is made with a heating element of nichrome, or other non-oxidisable wire, wound on mica sheets insulated on both sides from the metal plates by mica sheets and clamped firmly between the upper and lower plates.

The top portion of the boiling plate must be provided with a lip coming at least 1 in. below the bottom clamping plate in such a way that it is impossible for water or fat to creep up between the plates, and so on to the heating element; insufficient provision in this respect has been a fruitful cause of failure.

Both the top and bottom plate must be strong enough to withstand the tendency to buckle under the wide variations of temperature.

The top surface should be turned, not ground. Experience shows that a turned surface is a better heat transmitter to the utensil than a ground surface.

The wires of the heating element, from the point where they leave the heating element, should be strengthened up to at least three times the section of the element wire, and a sufficiently large hole provided in the bottom plate for bringing them away. Inattention to both these points (and it is common) spells trouble.

A terminal box should be provided on the base of the hot plate, and a flexible metallic connecting tube taken thence to the main terminal box of the cooker. In some boiling plates the heating wire is joined on to the copper wire running to the main cooker terminal box by simply wrapping the two wires together. Experience shows that the only way to avoid trouble is to provide a terminal box as near the heat element as possible, but far enough away to be not unduly affected by the heat.

The heating element should consist of two distinct and equal elements arranged one in the centre of the hot plate, and the other divided up, half on each side of the centre element.

The loading of an efficient boiling plate should not exceed 25 watts per sq. in., or be less than 20 watts per sq. in. of boiling plate surface. With a less loading than 20 watts per sq. in., the plate will be too slow for the cook's liking. A higher loading than 25 watts per sq. in. will produce too high a temperature if the plate be left full on without doing work. In such a case the temperature of the plate will exceed 650°—700° F. and the mica insulation will disintegrate and lose its insulating properties. All boiling plates should be tested, before being put out on circuit, for maximum temperature obtainable.

Nichrome wire can safely be used up to a temperature of 1,800° F. if an insulation to stand this temperature can be found.

The grill should be of the radiant heat type, loaded to 15 watts per sq. in. of surface for satisfactory and quick cooking. It is essential that as few leading-in wires be used as possible. Beaded wires are a more frequent source of trouble in a cooker than any other accessory. In the latest type of grill no leading-in wires whatever are used. The standard element is nichrome or other wire wound on mica, the full element being subdivided into six elements connected in parallel; by this arrangement, a failure of one element does not prevent cooking.

The oven must be thoroughly well heat insulated. If lagging is used, it must be very closely packed, and it is well to examine the lagging every 18 months or so, to see if it has powdered and settled down, leaving the upper part of the sides of the oven unlagged. The loading of an efficient oven need not exceed 1,000 watts per cb. ft. capacity. Sufficient regulation is provided by dividing the element into two parts, one of two-thirds heat and the other one-third heat. The oven should be white enamelled inside. A ventilation grill must be provided.

The oven heating plates or elements should be distributed over as wide an area as possible, for, by keeping the watts per sq. in. of heating surface low, the life is considerably increased. It is essential that the elements be arranged so that the leading-in wires are as few and as short as they can possibly be made. Beaded wires should be got rid of altogether if possible. It is safe to say that 75 per cent. of the oven and hot plate faults in the past have occurred on the leading-in wires and not in the heating element itself.

The rapid water boiler is fixed on the side of the cooker. It is advisable that it be fitted with a ball cock and connected to the main water supply; a burn-out is thus rendered impossible. It must be loaded to boil two pints of water in not more than four minutes.

The whole of the leads from the various terminal boxes of the cooker should be run to a main terminal box by means of metallic flexible tubing with a mechanical joint on to each piece of apparatus. The metallic flexible tubing provides the very necessary means of directly earthing each boiling plate, grill and boiler.

Only flat bottom utensils should be used. After long investigations, the "Judge" brand of spun steel utensils has been adopted, and found to be quite satisfactory for the purpose, and reasonable in price.

It has been found undesirable to fix the switches on the cooker itself. The type of switch now generally used is the Diamond "H," or Hart Manufacturing Co., type. Many other types have been tried and found quite unsatisfactory.

Owing to the necessity of equally distributing the heat in the boiling plates, the simplest and most advantageous method of control is by a series-parallel arrangement giving four positions.

The switches for the grill, oven (two switches) and boiler, should be of the ordinary "on" and "off" Diamond "H" type. Particular attention should be paid to the switches being large enough for the work, as the manufacturers are inclined to greatly over-rate their capacity.

It is certain that the name for unreliability which electric cooking has had in the past has been greatly due to only one main fuse being provided. It is a very serious thing for a household if, owing to a fault developing on a section of a cooker, the whole cooker is put out of action. The type of fuse used is of the "Dial," "Zed," or cartridge type. Open type fuses are not suitable.

One fuse is provided for each hot plate, one for the grill, one for the boiler, and two for the oven (one for the two-thirds heat, one for the one-third heat). By this arrangement it is well-nigh impossible

for a breakdown sufficiently serious to prevent cooking to happen; in fact, such a breakdown is now almost unknown. An indicating lamp is provided for each switch.

The wires between the main terminal box on the cooker and the switchboard are run in flexible tubing, which is metallically connected to the terminal box at the cooker end, and to the tubing of the mains at the switchboard end. This method is cheap, it allows of the cooker being shifted a foot or so, when repairs have to be carried out, without disturbing the connections, and the switchboard can be connected to the cooker before leaving the stores.

For the mains between the service and the switchboard, the armoured wire used in Martyn's wiring system is particularly useful, and is cheaper than the flexible tubing system.

The list price of the full equipment before described (not including rapid boiler or utensils) would be as follows:—

Cooker	£15 0 0
Switchboard	4 10 0
Connections and metallic tubing	0 15 0
Mains 30 ft. run	1 10 0
Main switch and fuse	1 10 0
Total	£22 15 0

Bought in quantities a discount of 33⅓ per cent. should be obtainable, so that the cost to the central station should be, say, £15.

The life of the apparatus is at least 10 years, and during that time the whole of the heating elements might require renewal three times, at a cost of 40s. Switches, fuses and lamps in the same time should not cost more than another 40s. Cleaning and inspecting once a month would cost, say, 10s. per year per cooker.

The total cost per annum, therefore, at an outside estimate, is:—

Depreciation, 10 per cent. on £15	£1 10 0
Repairs to heating elements and repairs to switches and fuses	0 8 0
Cleaning and inspection	0 10 0
Establishment charges	0 5 0
Total	£2 13 0 p.a.

Say, 12s. 6d. per quarter.

This figure may be objected to by some engineers as too high to compete with other forms of cookers. Such would do well to consider what they would be content to spend on a service to obtain such a load as this cooker will provide if it were offered to them in the shape of a motor load. It is conceivable that they would spend £12 without a murmur. But nine out of ten cookers need no extra service: why then should not the supply undertaking credit the cooker hire account with the sinking fund and other charges they would if necessary be prepared to incur for such a load, and are in fact not called upon to incur?

Although it is not *now* actually necessary, the hire scheme at Marylebone includes weekly not monthly inspection. It is only recently that we have been able to supply just the apparatus which absolutely satisfies the consumer, and by these weekly inspections, or nursings, not only has the consumer been kept in a good humour, but the department has been able to obtain quick and sure information of the troubles to be remedied before they become pressing or serious enough to lead to loss of business. About once every six weeks for the first few months our lady demonstrator also makes a call and, if necessary, gives a demonstration.

The consumption of an electric cooker is one of those things that cannot be calculated. The average consumption for a family of eight persons in full and constant occupation of the house, doing the whole of the cooking operations by electricity, but having a separate hot water supply for baths, and washing purposes (by means of a coke boiler or low fired kitchen range) works out at 1·9 units per person per day in Marylebone. It is to be remembered, however, that the whole of the cases taken represent well-to-do people, who not only entertain a good deal (often two or three times a week), but even, in the normal way, cook on an extensive scale. The figure given, therefore, represents a maximum consumption for an average well-to-do house. The consumption of a middle-class house would probably be, and by experience often is, as low as one-half to one unit per person per day. Where approximate comparisons can be made, the results show that with gas at 2s. 6d. per 1,000 cb. ft. and electricity at 1d. per unit, the cost is as nearly as possible the same.

As more exact comparisons can be made between the cost of a kitchen range used for cooking and supplying hot water for the house, and the kitchen range supplying hot water only and the cooking done electrically. In almost every instance a substantial saving is shown. A still greater saving can be shown by dispensing with the coal range altogether and installing a special coke-fired hot water apparatus such as an "Ideal" boiler.

At present prices for electricity and gas, neither can compete on cost with a coke-fired boiler. Consumers now using electricity for cooking tell us that it is clean, cool, and produces no fumes; that it gives better and surer cooking results, and that there is a saving of a least 10 to 15 per cent. in cooking meat.

The rapid electric boiler gives boiling water quicker than any other means, and it is principally for this reason that it is considered an absolutely necessary part of the apparatus. There is but small expense incurred by installing a cooker on approval. It has been found that only one in 10 cookers put out on approval ever comes back.

Commercial cooking offers an extremely attractive load to the central station, for it is either absolutely non-peak or of an extremely good load factor. The electric radiant heat grill is an extremely strong commercial proposition. First, because its competitors are not too satisfactory in cooking results; secondly, because it is quicker in action than other types; thirdly, because in cost of operation it is the most economical. (Current, 1d. per unit; gas, 2s. 6d. per 1,000; coke at varying London prices.) It is generally the first step to the complete electrification of the commercial kitchen.

In a large commercial grill the heating elements should be subdivided as much as possible. Separate heating elements of 250 watts each across the full supply voltage should be the maximum for moderate size grills, so that if an element open-circuits, only 250 watts of the apparatus is affected.

Every 1,000 or 2,000 watts of element according to the size of the grill should be separately fused, so that an earth will put out of action only a portion of the grilling surface.

The cost of operation is extremely low. A well-designed grill will grill as many as six chops at a time in 10 minutes for a consumption of ·4 unit only. A particularly good point of the commercial electric grill is the rapidity and extreme accuracy with which toast can be made with it.

The electric oven is about as good a line as the grill. The saving in weight of meat cooked in it, as against other forms of cooking, represents at least 7·5 per cent. of the cost of energy. The heating elements should be divided up into as many complete elements as space and other conditions will allow. Not more than 2,000 watts should be on one switch and fuse, and the elements comprising this 2,000 watts should again be sub-divided into, say, 500-watt sections represented by one terminal each on the oven terminal box.

The loading of all ovens for commercial work should not be less than 1,000 watts per cb. ft. capacity, or the oven will be too slow.

The author hopes that it has been made clear that cooking can be done electrically, that the apparatus, if properly chosen, is satisfactory and reliable, and that the cost of operation to the consumer is, at 1d. per unit, and under, at the most not heavier than by other methods. The electrical contractor will not hire apparatus because, in itself, it does not pay. The right people to push the cooking business are the supply undertakings, and not only must they push the business, but they must handle the apparatus; and until the apparatus is installed and working the supply man must be the only man to deal with the consumer.

The Cooking Load from the Supply Point of View.

By F. M. LONG, City Electrical Engineer, Norwich.

(*Abstract.*)

In order to arrive at some conclusion as to the cost of supply, the author takes the conclusions arrived at in the report of the Joint Committee of the I.M.E.A. and M.T.A. with reference to "charges for electrical energy supplied for traction purposes from combined stations."

In this report the expenses are divided into standing costs and running costs, and the allocation gives for the majority of existing stations a standing cost of £10 to £15 per KW., and a running cost of a fraction of a 1d. per unit.

The standing costs in most stations are made up to a large extent of capital charges covering expenditure on plant, part of which was put down many years ago at a cost per KW., perhaps three or four times that at which the plant can be purchased to-day, and the author thinks that most engineers will agree with him that it would be unreasonable and unnecessary to saddle a new load with a proportion of such charges which were incurred for the lighting load, and which the lighting load is well able to bear.

In order to treat the matter on general lines the author has taken the increase in the standing costs during the past five years and divided this by the increase in the maximum load, and he finds that for the majority of stations this works out at a figure between £3 and £5 per KW.; the author proposes to take £4 per KW. as the basis for the standing costs.

The running costs per unit vary very much, from about ·20d. in large stations and where coal is cheap, to ·5d. or ·6d. for small stations with dear coal.

As a mean figure that will apply to a large number of stations that have economical plant installed, the author proposes to take ·3d. per unit.

The different classes of cooking load comprising the total load on a station fall generally under three headings, as follows:—(1) Small and medium houses where the principal meal is at midday; (2) large and medium houses where the dinner is in the evening; (3) hotels, restaurants, luncheon and tea-rooms, &c., where the load is spread fairly evenly over a number of hours.

The magnitude of the load resulting from a cooking demand is important from the supply point of view. It is obvious that it will never be anything like equal to the maximum installed.

Mr. Street informs the author that at Southampton he finds that cooking apparatus produces, in the morning, a load of 20 per cent. to 25 per cent. of the maximum installed, and it is probable that 25 per cent. is as much as need be allowed for.

In individual houses it may be taken at about 20 to 25 per cent. of the maximum installed, but as the diversity factor is high, probably 5 per cent. would be ample to allow for the load produced on the station.

To reduce the cost per KW. to an average cost per unit it is necessary to know approximately the annual consumption per KW. For the present this may be taken at 400 units per KW. installed and the standing costs based on the above assumption of £4 per KW. will be:—5 per cent. of £4 divided by 400, ·12d.; which, added to the running cost, ·30d.; gives ·42d. as the total for the first-class of supply, excluding any special cost for distributing mains and services which will be dealt with later.

In houses where the principal meal is in the evening, the author finds that the cost would be :—

Standing costs, 25 per cent. of £4 divided by 400 ...	·60d.
Running costs	·30d.
Total	·90d.

This is on the assumption that the cooking apparatus is used all the year round, but as this is not the case with gas cookers, it is not likely to occur with electrical cookers.

In houses where the late dinner is the rule, the kitchen range would, in the majority of cases, be used in the winter, and it would be quite safe to assume that only half of the total number of electric cookers would be in use in the winter months giving a load at peak time of 12½ per cent. of the maximum installed, but in this case the units used would not be so much. Assuming 300 only instead of 400 per annum per KW. installed, we should have :—

Standing costs, 12½ per cent. of £4 divided by 300...	·40d.
Running costs	·30d.
Total	·70d.

Restaurants should form a very useful load, as the demand would be more or less continuous. This class generally will produce a load somewhat similar to a motor load with a load factor of probably 30 per cent., and the cost of supply would be :—

Standing costs	·39d.
Running costs	·30d.
Total	·69d.

The author gives load curves, two from houses in Marylebone, and a third from a house in Norwich, while a fourth curve shows the cooking load at the Polytechnic, London.

The question of what additional expense would be involved on account of services and mains is one that naturally occurs to an engineer.

It has been the general rule not to use anything less than 7/18 for services even for small houses, and when it is remembered that, with this size, the drop of pressure with 12 amperes on a length of 20 yards is only 1 volt, it will be seen that, with this size, a Tricity duplex outfit, taking a maximum of 10 amperes at 220 volts, which would be sufficient for a small house, can be installed without any alteration.

For a cooker with a maximum capacity of 5 KW., or, say, 25 amperes, a 7/16 service would be sufficient for a distance not exceeding 20 yards, or, for a short service, a 7/18 might be retained, as the average current would not be more than about 12 amperes, with occasionally 15 to 20 amperes for short intervals, which is well within the safe limit.

It may therefore be anticipated that not many additions would be required for services, and Mr. Street gives this as his experience at Southampton.

In all the central and industrial portions of a town, the distributing mains will generally be large enough to carry, without addition, a cooking load which, in such parts, will be small as compared with the general demand for lighting and power, or, if additions are required, the cost will not be abnormal in proportion to the revenue derived; but in residential areas where the density of load is very much less, and the cost of mains in proportion to revenue derived is much greater, the case may be different.

To arrive at any conclusion, it is necessary to estimate what the cooking load is likely to amount to, in proportion to the lighting load.

For small houses, with, say, 10 to 15 lights installed, the average lighting load may be taken at 150 watts per house, and for such houses a small cooking outfit, such as a duplex Tricity consuming as a maximum 2,000 watts, would be sufficient.

Assuming for some years to come that half the number of houses lighted had electric cookers and also, as earlier in this paper, that the average maximum load on the mains were 25 per cent. of the maximum installed, the load on the mains for cooking would be equivalent to 250 watts per house.

In the same way in a medium sized house with, say, 20 to 30 lights, and, say, a 5-KW. cooker, the lighting load would be, say, 300 to 400 watts and the average cooking load 625 watts.

It would appear, therefore, that the cooking load will probably be less than, and it is not likely to exceed, twice the lighting load in any residential area.

In districts where midday dinners are the rule, this would not be serious, and would not involve any addition to the mains, as a drop of four volts during the day would not much matter, but in suburbs of London and districts where late dinners prevail, some addition to the mains would be necessary.

The author finds that in Norwich in streets in which practically all the houses are lighted by electricity, the average of the lamps installed works out at from 2 to 2½ 30-watt lamps per yard run of street, and the maximum demand to ¼ of this or 20 to 25 watts per yard, so that for 220-volt supply the demand for lighting may be taken at ·1 ampere per yard.

This applies to two storey houses in continuous rows or to detached houses with gardens and having an average frontage of 20 to 30 yards, and generally to modern residential areas surrounding a town.

The requirements for larger houses in continuous rows may be double this.

Taking the higher figure or ·1 ampere at 440 volts per yard run and allowing a drop of 2 volts across the outers at the extreme end, it will be found that a ·05 triple cable will suffice for a distance of 200 yards assuming every house to be connected.

The author does not think, therefore, that it will be found necessary in the majority of cases to allow more than the rate per KW. ascertained as above and assumed at £4 per KW. The most that would be necessary would be to allow another 10s. to £1 to the figure ascertained for standing costs.

Assuming an extra 10s. to the £4 per KW., it will bring the case of late dinners from ·70d. to ·75d.

It is probable that in three-wire systems the greatest trouble will arise through drop of pressure in the middle wire owing to the fact that individual cooking loads will be heavy in proportion to lighting loads, and liable to come on suddenly. New mains should, therefore, be laid with ample capacity in this respect.

Summing up, it appears that the cost per unit under the conditions assumed will vary from ·42d. in the most favourable cases where the principal load is in the day to ·75d. when the load is mostly in the evening. The cost for other places being somewhere between.

As to the probable consumption of electricity for cooking, it has been assumed, for the purpose of reducing the standing costs to a rate per unit, that 400 units would be used in a private house per KW. installed; *i.e.*, 2,000 units per annum in a 5-KW. outfit, but this is rather a tentative figure, and more information on this point would be useful.

It is probable that the figure would vary very much in different houses, and it is possible that the consumption would vary more in proportion to the number of persons in a house than on the KW. installed. By some it is reckoned at about 300 units per annum per head.

It is the experience of gas undertakings, the author understands, that the maximum cooking load occurs on Sundays, and it may be assumed that the bulk of the output between sunrise and sunset on Sundays in the summer is due to cooking, although in the winter a good deal is also due to gas radiators.

It would appear that if electricity were used to the same extent as gas for cooking, we should have a peak in the middle of the day as high, if not higher, than the peak in the evening.

This, however, is a condition that need not be seriously considered at present, but it indicates that cooking will have a greater effect in levelling the load output curve in the case of electricity than in the case of gas.

Although not strictly included in the title of the paper, the use of electricity for the heating of rooms and of water for domestic purposes must be considered.

Radiators in private houses are principally a non-peak load, and can be supplied at a low rate, which is necessary if they are to be used extensively.

This is not the case though with radiators used in shops and offices. They are not required more than 1,000 hours in the year at the most, and this includes the peak hours.

While, therefore, in private houses a charge of ¼d. or even ½d. might be made, not less than 1½d. ought to be charged for shops and offices, which is, of course, too high for general use. There is however, the author believes, great scope for heating such places at a low rate, and he suggests that a restricted hour service might in many cases be arranged, especially for shops, either by a time-switch of by controlling the radiator and window light circuits with a throw-over switch, so that both could not be on together.

There are on the market some forms of geysers for heating water as it passes through, taking anything up to 16 KW. These the author regards as quite impossible from the supply point of view.

The only feasible plan would seem to be to use a Therol heater, or where the cost of installation would be a hindrance, simply an immersion element in a well-lagged storage tank, so that the expenditure of energy can be more or less continuous. With sufficient capacity in the tank there is no reason why the heating should not be done during the day and after the lights are out at night, which could be accomplished by means of a very simple "cut-out" operated by the lighting circuit. Under such circumstances, the only expense of supply would be the running costs, or, say, ·3d. per unit, as assumed above. At this figure, and assuming 85 per cent. efficiency, the cost would be at the rate of 19s. per annum for every 10 gallons per day required, allowing for raising the temperature 60° F.

As to the charges that should be made for current, it seems that at 1d. per unit, electric cooking with economical apparatus and careful use, is equivalent to gas at about 2s. 9d. per 1,000 cb. ft., and assuming that electrical apparatus could be supplied on the same terms as gas cookers, it would not be necessary to drop below this figure where gas is above 2s. 6d. per 1,000. If, however, consumers have to buy their stoves or hire them on a commercial basis which could not be less than 20 per cent. of the cost per annum, there must be some prospect of saving on the current.

It would seem, therefore, that where undertakings have no powers of hiring out apparatus it will be necessary to make the charge for current as low as possible but, where there are powers it may be as well to ease the terms of hire somewhat at the expense of the current.

In conclusion, the author thinks that supply authorities need not hesitate to supply current at rates which will be low enough to make the cost of cooking by electricity as cheap as by gas, and it is desirable that they should be prepared to do this as although at the present prices of apparatus the development is likely to be slow, the prices can only be reduced by the manufacture of greater quantities and everything possible should be done to stimulate this.

DISCUSSION.

MR. A. H. SEABROOK (Marylebone), in opening the discussion on the two papers, referred to the fact that ten or a dozen supply authorities had now introduced the ½d. rate for cooking. In Marylebone they had put on 1,400 KW. of heating and cooking load during the last year, and it had not appreciably affected the peak load. Some 70 or 80 complete cooking outfits had been installed, and it had not been necessary to add to the existing services in any way. The peak of a cooking load lasted only a short time; in his own case with a 30-ampere service he often took 60 amperes without troubling his neighbours.

MR. SILLERY (Partick) was of opinion that there was not one complete cooking apparatus that could be relied on; the designs adopted were open to criticism, and the attention of the engineer was always required.

MR. GROGAN (Berry Construction Co.) said if Mr. Long referred to the cooking load for individual houses, he must certainly allow for the maximum load of the apparatus (not 20 or 25 per cent. of it), and that on the top of the lighting load, which he forecasted would be negligible compared to the cooking load in future. He disagreed strongly with many of the statements made by Mr. Holmes, suggesting that he was bold to state emphatically certain matters of design which both maker and user had found from experience should be otherwise. Mr. Holmes favoured the radiant heat grill, but he (the speaker) pointed out that there were far more Tricity type grills in use than radiant heat grills. The speaker did not agree that the electric stove should follow gas stove design, or that three heats were required for a hot plate; the objection to the medium heat, when only one heater was in use, being a tendency to buckle the plate. The use of imperfect utensils on a hot plate tended to burn the latter out, owing to the lagging of air between the pan and plate. The introduction of fuses on all hot plates was not necessary; there were between 4,000 and 5,000 Tricity cookers in use, and fuse troubles were rare—in any case the fuse should be sufficiently heavy to neglect small troubles. The hiring out of cooking apparatus and sending it out on approval was important; in one town where 200 Tricity cookers were in use, only 4 per cent. were sold. It appeared from the figures given by Mr. Holmes that with a heavy black oven a family of eight persons would take, say, 6,000 units per annum with a 7-KW. demand, but with the Tricity oven he had found that the same service could be obtained with at most 4,000 units and a 3-KW. demand. In conclusion, he urged the necessity of show-rooms and a complete selling organisation to the engineer.

COUNCILLOR SINCLAIR (Swansea) emphasised from his personal experience the advantages of electrical cooking; it cost rather more than other methods, but if he could purchase energy at 9d. per unit he would not be a loser as regards cost, and in any case he had better cooked food, and was not going to give it up.

MR. R. BORLASE MATTHEWS said there was a great need for more information on electric cooking from the user's point of view. It was not a matter of experiment now, the apparatus was reliable, and the advantages as to saving in weight of cooked meat and in other ways were well recognised. He urged the necessity of further co-operation between central station engineers and between the users and makers of the apparatus, in order that the results might be available.

MR. W. A. VIGNOLES (Grimsby) emphasised the simplicity and exactness of electrical cooking. He had instructed his staff by telephone as to what switches to use in cooking a joint, and the latter was cooked perfectly; consumers in difficulties could quite well be instructed over the telephone, as with electrical cooking the results could be predetermined with accuracy. There were a number of assumptions in Mr. Long's paper, and it was a question how far the ½d. rate for cooking could be justified, but probably the experience at Southampton might give further information as to this. He pointed out that the overloading of feeders and services with resulting pressure drop would affect the heat and cooking time of an oven, and further urged the necessity of hiring out such apparatus. From his experience with various types of apparatus, while not prepared to say that the bright oven was better or worse than the black oven, it seemed that the Tricity type of cooker did consume less energy for its output.

COUNCILLOR CROWTHER (Sheffield) spoke as to the necessity for cheapening cooking apparatus and lowering the cost of energy to promote electric cooking in the smaller houses.

MR. JOHN CHRISTIE (Brighton) made the somewhat novel suggestion that municipal authorities instead of voting surplus money to the rates should buy outright a certain number of cooking outfits. He estimated that £1,000 spent in this way on 100 outfits would yield quite £150 in rentals and an output of a quarter of a million units, valued at, say, £1,000.

They had recently purchased 25 outfits in this way in Brighton and obtained very satisfactory results. He added that the heavy laundry iron yielded in Brighton a revenue of £11 5s. per year per KW. demand.

MR. W. H. COOKE (Luton) said his investigations of cooking conditions convinced him that a price of ½d. per unit was necessary for electric cooking with gas competing at 1s. 11d. per 1,000 cb. ft. He had introduced the ½d. rate two years ago, and had now some 390 KW. of cooking load as compared with 30 KW. previously when the rate was 1½d. per unit. For the last three years the heating and cooking units supplied had been 19,000, 59,000 and 260,000, and the profit on the last year was the biggest one ever made. The rate was a flat one of ½d. per unit, with no initial charge. He thought it remained for the manufacturer to reduce the cost of apparatus.

MR. BIRKETT (Southend-on-Sea), MR. HAME (York), and the PRESIDENT also took part in the discussion (the latter hinting that failing reduction in price of apparatus by the manufacturer, the station engineer would have to consider the question of providing ovens himself), and both authors briefly replied.

Electric Cooking and the I.M.E.A.

By R. BORLASE MATTHEWS, Wh.Ex., M.I.E.E.

Electric cooking was *the* subject of conversation above all others at this year's Convention. One of the most valuable features of these conventions is the interchange of personal experiences in an informal and unofficial manner in the intervals between the official meetings. Certainly the personal experiences covered a wide range, and a few, at any rate, had had most unhappy and unfortunate experiences, but they were in the minority, and their troubles seemed largely due to an imperfect understanding of both the practical requirements of cooking, and the adaptation of electricity for that purpose.

The general conclusion was that electric cooking was now well beyond the experimental stage, and that in fact it had attained to its true and merited position, and was going to form a very important load for central stations. There were still a few who had not fully appreciated the fact that the electrically cooked product was far superior to food cooked by any other process, but they were more difficult to find than last year, thanks, doubtless, to the self-sacrifice of their patient wives, who had, so it was stated, carried out countless experiments with good, bad, and indifferent stoves.

Then, also, the fact now seems to be more generally recognised that there is really a considerable economy in the cooking of meat by the electric way, as compared with other methods. This fact was emphasised during the afternoon devoted to the discussion on electric cooking by a diagram, which summarised, albeit in a very conservative manner, a number of tests made with various weights of meat.

It would, undoubtedly, be of very great assistance to central station engineers and to manufacturers of electric cooking apparatus, and also to the ultimate advantage of the general public, if the data that has been collected as the results of experiment by individual central station engineers could be collected and analysed, and thus be rendered of service to everyone who is interested in the distribution of electrical energy. Perhaps the readers of this paragraph would communicate their views on this matter to the Editor of the ELECTRICAL REVIEW. Really, as a matter of fact, the time for petty experimental work has now passed, for electric cooking is now well established, so that it is rather a waste of time to keep on repeating minor experiments; it is just like a body of students proving that Ohm's law is true, over and over again—it is becoming tedious. Still, the constant repetition has driven home slowly, but surely, the realisation that electric cooking is not only as good as, but also has many superior advantages over, other methods.

The next trouble, or, perhaps, it might be termed nightmare, of those who had found out that electric cooking was entirely satisfactory, was the question whether the apparatus was really reliable. This matter of reliability, of course, is not one that can be determined by isolated experiments, rather, it can only be determined by those who have had the opportunity of handling the apparatus in large quantities. Unfortunately, central station managers who have this experience are few and far between, hence Mr. H. H. Holmes's paper was very greatly appreciated, for it essentially bore the stamp of experience. There is no question but that Mr. Holmes's paper forms an excellent guide as to the main points of an electric cooker.

It should not, however, be too slavishly followed, for several of the minor details are open to question, and further modifications will undoubtedly be made in many of these minor details as more and more experience is gained. Of course, if one is anxious to specify an ideal electric cooker, it must be realised that the stove that is constructed to that specification cannot be built for a mere song. Mr. Holmes draws special attention to this fact. Even when compared with a gas cooker, the first cost of an electric cooker of the same capacity must be higher, for, in addition to the equivalent

component parts of a gas cooker, an allowance must be made for the thicker and better lagging and the cost of the heating elements and switches.

It was noteworthy that the critical remarks of Mr. Sillery, of Partick, as to the unreliability of electric cooking apparatus (unless built by his department, with elements supplied by a heating apparatus manufacturer), were not endorsed by the general body of engineers present. For it is now generally recognised that the apparatus supplied by good makers can be depended upon.

Actual systems of cooking were not much discussed—that is, as to whether it were better to employ (*a*) separate utensils, each provided with its own heating element, or (*b*) combinations of hot plates and portable ovens (often rudely called "biscuit boxes") of which the "Tricity" and "Simplex" cookers are prominent types, or (*c*) the complete stove, with heavily lagged oven, which was advocated in Mr. Holmes's paper, and of which the General Electric Co.'s "Beeton" cooker is an excellent example, or (*d*) heat-storage ovens, of which the "Therol" is an illustration.

If anything was said, preference was usually given to the lagged oven. The objection raised against the portable oven was that not only did it involve the conversion of the cook to the advantages of electric cooking, but also the necessity for educating her in a new way of cooking.

The discussion waged hot round the prices that should be charged for energy sold for electric cooking purposes. It was positively fanned into a flame of righteous indignation in some quarters when Mr. A. H. Seabrook invited engineers to join his "Halfpenny a Unit Dining Association." It quite brought one back to the now almost historic days when the controversy raged as to whether it were possible to make a profit out of units sold for power purposes at 2d. or even as low as 1½d. Nowadays, of course, central station engineers are only too glad to get all the power load they can at a penny a unit or just under, for they have found it very profitable. And so it will undoubtedly be with a cooking load—it is the big turnover that counts. The load curve diagrams exhibited were of a nature well calculated to make a doubting engineer take his courage in both hands and prepare to meet the demand with more foresight than when the introduction of the tungsten lamp had to be tackled. Mr. Long's paper demonstrated very clearly the basis of the essential calculations necessary for investigating what a profitable rate of charging should be, and, further, contains some very interesting data. It will, however, be necessary in conjunction with this paper to refer to the report of the joint committee of the I.M.E.A. and the M.T.A. with reference to "charges for electrical energy supplied for traction purposes from combined stations," otherwise such items as the percentages given at the beginning of the paper will not readily be comprehended. Some of the statements are a little involved, especially in connection with the comparisons made between gas and electricity.

A lead has been set by members of the Halfpenny a Unit Dining Association, and as they comprise the more enterprising members of the profession, it is only a question of time before the others follow suit.

It was very clearly emphasised that the diversity factor of an electric cooking load was an excellent one, hence a bogie vision as to the requirements of large sums for new mains extensions was exploded. Anyhow the growth of public demand for cooking apparatus is bound to be gradual, it cannot possibly reach its zenith in a few months, even if the manufacturers could supply the apparatus quickly enough. Its growth will certainly be extremely slow, unless well thought-out hiring schemes are offered to the public.

New Telephone Works in Russia.—The Mix and Genest Telephone and Telegraph Works Co., of Berlin, has concluded an agreement with a Russian syndicate, with which French and Russian banks are closely associated, for the formation of a Russian telephone factory to manufacture, on the basis of the Berlin company's patents and experience. The new company will have a capital of £50,000. The Russian company has been placed under the obligation to purchase from the Berlin company all apparatus not made in the Russian factory.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

Bonus System.

With regard to the interesting article in last week's ELECTRICAL REVIEW on bonus systems, this, I think, is a subject which should always be argued out direct from first principles.

To start by defining our terms, we may say, for the purpose of this argument, that there are only two speeds at which a man works—day-work and piece-work speed. There are only two speeds, that is, providing he is working honestly in each case.

When being paid at day-work rate he works at ordinary speed, and when being paid at piece-work rate, he works at extraordinary speed—a speed at which no one could expect him to work without the special inducement which is given by this system of payment.

The question now arises as to what the piece-work rate should be, and this can only be determined in a backward kind of way. Suppose we say that it should be twice the day-work rate, then we see that this would mean that his speed when being paid day-work rate is only half his greatest. But a man's ordinary honest speed is certainly greater than half his greatest speed, and so we see that the ratio 2 is too high, and take a lower figure.

The ultimate determination of this ratio will be based upon a knowledge of practical conditions guided by the above considerations, and it will probably be thought to be between $1\frac{1}{4}$ and $1\frac{1}{2}$.

We can now consider the various systems in use. First, take the ordinary piece-work system in which a man is paid so much per piece, and makes as much money as he can. It is clear from the above argument that the prices of the pieces should be such that a man makes $1\frac{1}{4}$ to $1\frac{1}{2}$ times his ordinary day-work rate, when working at top speed.

Next take the bonus system in which only half the amount saved is paid to the man. Arguing as above the man should make $1\frac{1}{4}$ to $1\frac{1}{2}$ times his ordinary rate, and since only half of the amount saved is paid to the man, it is clear that the price of the articles should be such that the amount saved, when working at top speed, is exactly twice the amount of the bonus determined by the above reasoning.

Thus this system is only a more complicated method of working the old piece-work system, though it has the advantage that any error in pricing the articles produces a smaller result on the pay sheet. But it also contains a great disadvantage, viz., that the faster a man works, the less he gets paid *per article*. It is difficult to see why a definite amount of work should be worth less because it has been done quickly—especially when speed is the very object of these systems.

I also notice that Messrs. Walton and Brewerton, in their interesting article, consider it to be a disadvantage of the bonus system that the rate of wages increases out of proportion to the saving in cost of production. They consider this unfair to the employer, but it is difficult, I think, to see where the unfairness comes in.

It is quite true that the rate of wages does increase as the man works faster—but so does the rate of work. We must compare rates with rates. And it is difficult to see why we should consider rates of wages at all when dealing with men on piece-work systems. After all a man's day-work rate is fixed entirely in proportion to his skill and without any regard to the speed at which he works. The question of rate only enters into piece-work systems when fixing prices; for example, a certain number of articles have to be made, and they require such skill to make that we know from practical experience that the man who makes them will expect to earn so much per hour; so that the price of the articles has to be such that when working at top speed a man's rate is equal to his ordinary rate plus the bonus, the amount of the bonus being determined as already shown. So that we only consider rate of pay when pricing an article, because it represents the amount that has to be paid having regard to the skill required,

With reference to the system devised by Messrs. Walton and Brewerton, it will be noticed that whereas in the ordinary bonus system the price *per article* paid to the man decreases as his speed of working increases, it can be shown that in this new system the price also decreases, but at a greater rate, and seems, therefore, to me to be still more unfair to the workman.

These gentlemen claim the advantage for their system that it is impossible for a man to earn double his ordinary rate, but surely this should be a physical and not an arithmetical impossibility.

To sum up, therefore, it appears that there is nothing so satisfactory as the whole system, in which a man is paid a fixed price per article and makes as much per hour as he can.

A. G. H.

June 19th, 1912,

Coal Strike and Tramways.

The unrest associated with the recent coal strike may, as you have indicated in your columns, spread in the future to the employés connected with electric supply and tramway undertakings.

Certain forms of advanced legislation in Australia have, from time to time, been severely criticised, and very rightly so. Legislation here has, however, produced at any rate one form of regulation which could, with advantage, be copied at Home. Acts have been brought into force making it a penal offence for any employé to break his contract with his employer, when such action shall interfere or shut down any railway or tramway, or the supply of gas, water or electricity, or any sanitary service. The South Australian Act deals with railways, tramways and gas and water supply only. Sec. 17 of the Employers' and Employés' Act for Victoria curiously does not include either railways or tramways, but refers only to the supply of gas, water, electricity and the control of sanitary service.

During recent unrest here, I had occasion to post up Sec. 17 from the latter Act, and to inform employés of both their and our own responsibility in connection with the continuity of our electric supply, and that any improper action on their part would make them liable to a penalty of £20, or three months' imprisonment. I enclose you herewith copies of the clauses in the Acts referred to above. In view of the great importance of tramway transit, and the supply of electricity for light, tramway, and power purposes, it would seem very desirable that home legislation should follow on these lines.

P. J. Pringle,
Engineer and General Manager,
Electric Supply Co. of Victoria, Ltd.

Ballarat, *May 22nd*, 1912.

Employers' and Employes' Act, Sec. 17.

Where a person employed by a municipal authority, or by any company or contractor, upon whom is imposed by Act of Parliament the duty, or who have otherwise assumed the duty, of removing, dealing with, or treating sewage of any city, town, or borough, or shire, or supplying any city, town, borough, or shire, or any part thereof with gas, or electric light, or any other species of light, or water, wilfully and maliciously breaks a contract with that authority or company, or contractor knowingly or having reasonable cause to believe that the probable consequences of his so doing, either alone, or in combination with others, will be to deprive the inhabitants of that city, town, borough, or shire, wholly, or to a great extent, of their supply of gas, or electric light, or other species of light, or water, or to interfere with the sewerage thereof, he shall on conviction thereof, by a Court of Petty Sessions or on indictment or presentment as hereinafter mentioned, be liable to pay a penalty not exceeding £20, or be imprisoned for a term of three months with or without hard labour.

South Australian Act.

Any servant in the employ of the Government or of any person or persons or body corporate upon whom is, or may be, imposed by any Act or ordinance the duty, or may have otherwise assumed the duty, of carrying on and conducting railways or tramways for passenger and goods traffic, or for either of such purposes at any place within the said province, or who may have the duty imposed as aforesaid, or who may assume the duty of carrying on and conducting railways and tramways for passenger and goods traffic, or for either of such purposes at any place within the said province, or who may have the duty imposed as aforesaid, or who may assume the duty of supplying any city, town, village or place, or any part of either with gas or water, wilfully and maliciously breaking his contract of service, or hiring with the Government, or such person or persons or body corporate, knowing or having reasonable cause to believe that the probable consequence of his so doing, either alone or in combination with others, will be to deprive any of the inhabitants of the said province, or of any city, town, village, place or part of either, wholly, or to a great extent, of the use of such railway or tramway, or of their supply of gas or water shall, on conviction, be liable either to pay a penalty not exceeding £20, or to be imprisoned for a term not exceeding three months with or without hard labour. But provided that no servant shall be liable to conviction under this section unless there shall be posted up at the railway, tramway works, gas works or water works as the case may be, a printed copy of this section in some conspicuous place where the same may be conveniently read by the persons employed.

An Objectionable Clause.

Mr. W. J. Webb has apparently missed the point of the letter which began the correspondence under the above heading. If he will take the trouble to read it again, it will be—or ought to be—clear to him that I was objecting, not to the clause stipulating for the payment of Trade Union rates, but to that appointing the Trade Union *sole* arbitrator between the contractor and his men.

The condition that Trade Union rates should be paid was too usual to have required comment. To my mind, indeed, it is a fair clause, as it simply amounts to the enforcement of a recognised standard of wages. There are few employers but would gladly pay their skilled workmen half-a-crown an hour if their competitors were obliged to do the same. All labour is admittedly underpaid. Skilled manual labour in particular ought to be esteemed more honourable, and be better remunerative than the "genteel" avocations of quill-driving or counter-jumping. But it is not, unfortunately. To-day the disproportion between the fruits of labour and commerce is as markedly unfair as it doubtless was in the days of Tyre and Sidon. It is the inevitable result of the first law of nature; a law which neither the Poplar Guardians nor Parliament can override. Competition—competition between man and man, firm and firm, nation and nation. That is the factor which in the long run must wreck the most Utopian dreams of Socialism. A Labour Government might enact that all electrical tradesmen should be paid 50 per cent. more than they are now. Unless they could, at the same time, enforce the same rate among the Germans, the Chinese, the Fiji Islanders, the only result would be the closing of every electrical workshop in the United Kingdom, and such a further rise in unemployment as has attended every successful effort of the Trade Unions to raise wages. Pardon me, Sir, if I appear to digress; I am attempting—in vain, I fear—to persuade Mr. W. J. Webb that no fair-minded contractor objects from *malice prepense* to paying his men good wages; and he gladly does so when, as in the present instance, he is safeguarded against the undercutting of his rivals.

The unusual and objectionable clause is that which constitutes the Trade Union sole arbitrator. The objection is not to the Trade Union *qua se*. It has been raised repeatedly against architects and consultants when these have been appointed sole arbitrators. It would assuredly be raised in the unthinkable event of that unlucky bottom dog, the contractor, being appointed sole arbitrator. In brief, it is an objection to the principle of any one party interested in a dispute being appointed sole arbitrator thereon. How can such a one give an unbiased verdict in a dispute affecting, in the case of an architect, his client; in the case of a Trade Union, its member or potential member? Unfortunately, moreover, the Trade Unions in particular have made themselves notorious by their class partisanship, by their openly professed repudiation of contracts and contempt of equity in any dispute involving their interests. No thinking man would deny the good done by Trade Unions in the past in bettering the lot of the workers. But, petted by Parliament and petted by the Press, they have grown mighty in the land; and with power has come the abuse of power, corruption, communism and class war. He would be mad who would look to-day for impartial justice from a Trade Union leader.

Mr. W. J. Webb's own organisation is a weak one, and one which most of the best men in the trade ignore. But there is no reason to suppose that Mr. W. J. Webb would

prove a more impartial judge between master and man than more prominent labour leaders—such as those doughty wagers of class war, Messrs. Ben Tillett and Will Thorne, M.P. Indeed, the tone of Mr. W. J. Webb's letter is little calculated to increase confidence in his fitness to act as a sole arbitrator. Previous correspondence on this matter he sums up as a "howl"; the opinion of those who are so unfortunate as not to agree with him is "twaddle." Such epithets may tickle the taste of the more ignorant of his followers; they are of no avail in proving his case to your readers, who alone, as non-disputants, are in a position to say whether one side or the other is talking "twaddle." Mr. W. J. Webb has not yet been appointed "sole arbitrator." He himself has supplied additional reason, if such be needed, against the objectionable clause that would so appoint him.

Fairplay.

Referring to the E.T.U. letter in last week's ELECTRICAL REVIEW, I certainly think Mr. Webb should carefully read my letter over again, he will then understand that my suggestion was to delete all reference to Trade Union rates and conditions, and substitute "local conditions and rates of pay," with the wages rate scheduled. If this suggestion was carried out, I fail to see how this would be "leaving it to the fairness of the contractor." Dear me, what a crime it would be if a member of the E.C.A. should happen to employ a workman at a bawbee per hour under Union rate! I suppose Mr. Webb would take no explanation, therefore the contractor would have to clear out. Alas! for the poor contractor who is found guilty of such an iniquitous offence. What a pity to think the first time the E.T.U. get a fair show, the wicked contractor should try and upset same. Next time I should advise a show founded on principles of wisdom and fair play, and eradicate all the socialist rot by which the atmosphere of Trade Unionism is permeated. Regarding my compliment, I would ask the E.T.U., when making their suggested new rules, to remember the old fable of the "two frogs" with the moral, "easier in the mud than out."

Percy D. Collins,
Electrical Contractor.

Wimbledon, *June 24th*, 1912.

Trade with Canada.

In your issue of May 17th I saw under the heading, "Trade with Canada," a suggestion from Mr. Philbrow regarding the education of emigrants on matters of loyalty to home firms in a new land. His suggestion is obviously well meant, but does not by any means offer a solution to the difficulty of inducing Canadians to pay British prices. The people who form the object of Mr. Philbrow's suggestion are, for the most part, agricultural or skilled labourers, and do not, until many years after their arrival, become the purchasing element of this country. I speak generally, and, of course, recognise that there are exceptions to this rule.

The real need is this. Old country firms must of a necessity get in touch with this country in a very much more thorough sense than they were in the habit of doing. The Canadian buyer wants good stuff, and knows he can get it from the British Isles. In fact, he will go out of his way to get old country goods, and will pay with good grace the extra price for the better article; but he absolutely will not stand the scant attention bestowed upon him by the majority of old country manufacturers. The firms in England, Ireland and Scotland who have proper organisations in this country are doing a big business, simply because they give the service and local attention. The Canadian wants efficient service, and if he gets it will open his purse strings and pay handsomely for it. There is no time in this country to wait for things which ought to be available on the ground, and when firms in the old country condescendingly permit stuff to casually drift through weeks late in delivery, a buyer turns round and goes to the States where the system of prompt and efficient service is everyday business. Who can blame him?

It is truly gratifying to find that the tendency is for British manufacturers to come here and see for themselves that enormous business is to be done if properly handled. Let them not treat Canada as a new, crude and uneducated country which may amount to something worth their attention in years to come. The buying is being done now, and the tendency is being moulded now. In years to come it will be too late to retrieve lost opportunities.

The business being done is truly wonderful, and let me conclude by saying with the utmost conviction that Canada *wants* to do business with the old country. But believe me, unless the old-country manufacturers drop the patronising and condescending attitude with which they have hitherto (many of them) regarded Canada, they will most surely alienate the business interest of a wonderful and surpassingly rich country.

Let us, therefore, educate the man who does buy by showing him how well we can do things and how smartly we can look after him, rather than educate the very worthy but temporarily unimportant ordinary emigrant.

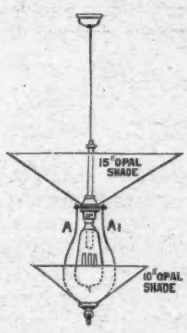
I have the honour of Mr. Philbrow's acquaintance, and am sure he will agree with me as to the commercial end of things engineering.

Thurstan W. Fairhurst.

Winnipeg, Canada,
June 10th, 1912.

The Indirect Lighting of Rooms.

Many readers have, doubtless, been interested in "Whistlefield's" recent article upon the above subject, also the remarks made by "Resident Engineer," in your last issue, and it occurs to me to submit a simple design which I have found very effective, and which at the same time is easily and cheaply made from *standard* material. The legs of the



ordinary shade carrier A A_1 can easily be bent by hand to accommodate almost any kind of lamp, and to vary the distance between the shades should it be desirable to do so. The 15-in. and 10-in. conical opal shades are very old friends, and the ½-in. S.C. holder and short length of brass tube, with a cord grip at the top, completes the job—not forgetting, of course, the lamp, flex and ceiling rose.

J. R. Parkington.

Newcastle Emlyn, South Wales.
June 24th, 1912.

Most people will agree with the remarks in your issue of June 14th concerning the shadowless and restful qualities inherent to indirect lighting, and "Whistlefield" has stated the case in a concise manner that is easily understood. But he is also responsible for some most extraordinary statements regarding the practical side of the question, and it would appear that he pays no attention whatever to the information imparted by the technical Press anent this subject.

The object of any indirect lighting fitting is to reflect as much light as possible on to the ceiling, in such a manner that the minimum amount is absorbed by the walls, and the maximum possible evenly distributed over the working plane, even illumination of the ceiling being no criterion of the proper or most efficient lighting of the room; in practice the illumination is required on the working plane, and not upon the ceiling.

In order to attain this object efficient reflectors must be used, and since it is an established fact that an opal shade is a most inefficient and unscientific reflector, one marvels at the advocacy of your contributor in this respect. Not only

is an opal shade translucent—so that such a fitting as detailed would produce what is usually termed "semi-indirect lighting," owing to the large amount of light directly transmitted, which incidentally produces shadows—but also the light distribution from an opal shade is entirely uncontrolled, so that the maximum efficiency can only be obtained under the *most* favourable conditions of height of ceiling and dimensions of room. A properly designed reflector is not only more efficient, but also allows the efficiency to be maintained under varying conditions, according to the type employed.

It is generally known that silvered glass is a most excellent reflector, and, if scientifically designed, it can now be made for almost any particular requirement.

After much research and infinite trouble, a type has been evolved which is eminently adapted for indirect lighting. There is no streaky image of the lamp filament as with an opal shade, and when correctly suspended an ideal light is obtained on the working plane, without the losses due to wall absorption. Such reflectors as these are used in the B.T.-H. eye-rest system of indirect illumination. The exterior bowl, which is opaque, can be designed so as to harmonise with the decorative scheme of the room, or may be chosen from a utilitarian point of view, so that in this case at least, the main object of the fitting is to provide both efficient lighting and a pleasing appearance at one and the same time, the efficiency being obtained without in any way sacrificing decorative considerations.

By using several lamps with a reflector for each lamp, one obtains the advantage of a multiple control and lessens the risk of failure, while retaining all the other advantages consequent on indirect lighting, which are obtained at a very slight loss in efficiency and a considerable gain in comfort, compared with a properly designed direct lighting scheme.

John H. Asdell, M.Sc.

Rugby, *June 18th*, 1912.

INTERNATIONAL RADIO-TELEGRAPHIC CONFERENCE.

The delegates attending the Conference (which will be sitting until the middle of next week) are undergoing an almost continuous round of festivities and excursions; except on Sundays, they have had only about four free evenings during their sojourn in London. Last week they were the guests of the leading exponents of wireless telegraphy in this country.

On Thursday, June 20th, we joined with a large party in a visit to the Woolwich Works of Messrs. Siemens Bros. and Co., Ltd., who, as our readers will remember, have taken up the manufacture of wireless apparatus on the Telefunken system in this country. A special train conveyed the visitors from Charing Cross to Charlton, whence they proceeded to the works in brakes; there were about 300 present in all, including many well-known engineers and a considerable number of ladies. The cable manufacturing departments were thrown open for inspection, and the work of stranding, taping and lead-sheathing cables, both for heavy currents and for telephone and telegraph purposes, was in full swing, presenting many features of novelty and interest to the lay visitors. A large aerial has been erected between the chimney shafts of the works, and a 10-kw. ship station was shown communicating by this means with the station at Nauen, 1,000 km. away; this equipment, with an output of 5 kw. from the antenna, can transmit waves of 300 to 2,500 km., the adjustment being effected by means of a variometer. Next, a variety of portable sets of apparatus was inspected, designed mainly for military purposes; these sets were respectively installed in wheeled vehicles, for use with artillery, &c., and in leather cases suitable for transport on horseback, special pack-saddles being provided for the purpose. Four horses or mules suffice to carry a complete outfit of the latter type, including a petrol-electric generating set and a pair of telescopic masts, each 12 metres in length when expanded. The wheeled military station, weighing in all less than 2 tons, with a mast 25 m. high, has a range of 200 or 300 km., but with a mast 45 m. high, twice this distance can be covered.

The guests then proceeded to a large room on the upper floor of the new buildings which have been erected by Messrs. Siemens Bros., where an exhibition of Telefunken apparatus, ancient and modern, had been arranged; this display was of great historic interest, and will remain open to the delegates until the end of the Conference. It included, besides examples of experimental and commercial apparatus dating from 1902 onwards, the most modern types of equipment for warships, merchant vessels and airships; a land station transmitter of 15—20 kw., specially designed for use in tropical countries, with the high-pressure apparatus immersed in oil; various receivers and measuring instruments, a sound intensifier and photographic receiver, and a variety of miscellaneous apparatus. Not the least interesting item was a scale model of the great station at Nauen, the 200-m. tower of which was destroyed in a gale on March 30th last; a still higher tower will be erected at an early date.

A practical demonstration of a number of new apparatus followed, in which Count Arco himself took part. The Telefunken compass, described in our issue of June 7th, and the secret telegraph system of Capt. Hovland, which we described on September 15th, 1911, were shown, as well as a miniature apparatus simultaneously receiving messages from two other stations, on a single antenna, with two receivers. The principal feature of the demonstration, however, was the new high-frequency generator developed by Count Arco; the construction of this has not yet been made public, owing to patent questions, but we gather that, like the Arnold generator, described in our issue of November 24th, 1911, it is of the self-resonant type of inductor alternator, generating impulses at frequencies far beyond the polar frequency of alternation, and capable of producing waves of 10,000, 5,000, or 2,500 m., with power sufficient for a range of at least 1,000 km. A large bank of lamps was shown, supplied with power through the ether from this machine, and the high frequency was demonstrated with the aid of a resonating coil and lamp, and in other ways. As regards the keynote of the Telefunken system—the "singing quenched spark"—we may refer our readers to the article published in our issue of February 17th, 1911.

The proceedings concluded with a dinner given by Messrs. Siemens Bros. & Co. to the delegates and other visitors, in the other half of the enormous room in which the demonstration took place; the room had been decorated with charming effect, and by some magic process an excellent repast was provided in a style that could hardly have been surpassed even in one of the great London hotels. Mr. G. von Chauvin presided, and offered a hearty welcome to the guests in the name of the company, to which Sir H. Babington Smith, president of the Conference, responded. M. A. Frouin proposed the toast of "Messrs. Siemens Bros.," which was acknowledged by the chairman, and other guests expressed their appreciation of the hospitality of their hosts and of the progress made by the Telefunken system of wireless telegraphy, of which they carried away souvenirs in the shape of a silver model of the Telefunken spark-gap. The visitors then returned to London by special train.

On Saturday the delegates were entertained by Messrs. Marconi's Wireless Telegraph Co., Ltd., at their new works at Chelmsford, travelling from Liverpool Street by special train. These large works have been erected to cope with the increasing demand for Marconi apparatus, the previously existing factory, though working night and day, having proved inadequate for the purpose. The new buildings were completed and brought into use last month, and have been laid out on the most modern and scientific lines, in the short space of 17 weeks from the purchase of the 10-acre site. The first item of the programme was an inspection of the factory, of which a detailed description must be deferred for the present; suffice it to say that the manufactures and processes there seen were of great interest, and the equipment of the highest class, British machinery and apparatus having been installed throughout; the workpeople also appeared to be of an exceptionally high standard. The show-room was especially interesting, as it contained working examples of wireless stations for warships and the mercantile marine, including a new ½-kw. set for cargo boats, comprised in the smallest possible space and fitted with the Marconi disk discharger. A 15-kw. ship set in this room was in operation, communicating with the Marconi station

at Poldhu, throughout the afternoon. A temporary tubular mast, built up of flanged steel segments to a height of 200 ft., has been erected near the works for this purpose, but later two masts 450 ft. high will be erected, and the 100-ton concrete anchors for these are already in position. In the grounds demonstrations took place of various Marconi equipments; military sets mounted on wheels, or arranged for transport on mule back, were shown in operation, with various types of portable masts, communicating with the company's station at Golder's Green; a photographic receiver capable of working at 50 words per minute, and representing the type of instrument to be used in connection with the Imperial chain of long-distance stations which is to be established by the Marconi Co. for the Post Office, was demonstrated; an experimental apparatus on the lines of the automatic calling device recently foreshadowed by Mr. Marconi was operated; and Mr. Bellini demonstrated the working of the Bellini-Tosi system of determining the direction of origin of wireless signals (described in our issue of December 15th, 1911), which has been taken up by the Marconi Co. There was very much to see, and the display was of great interest. In the course of the afternoon the guests were entertained with light refreshments in a large marquee, and afterwards they were conveyed back to Liverpool Street.

In the evening the delegates were the guests of the Marconi Co. at dinner at the Savoy Hotel. About 360 were present, including many ladies, and during the evening the latter were presented with silver scent flasks, while the gentlemen each received a handsome souvenir consisting of a silver model of the Marconi disk discharger, cleverly designed to form a cigar-lighter, and packed in a leather case. After proposing the health of the King, the chairman, Commendatore Marconi, welcomed the delegates, and thanked them for their presence at Chelmsford and at that table; he invited them to accept the souvenir of that occasion, and drank to their healths. Herr Koehler, president of the German delegation, responded, eulogising the achievements of their host, especially in respect of communication with ships at sea; in the name of the Conference he thanked the Marconi Co. for their hospitality, and for the souvenirs with which the guests had been presented. Prof. A. Battelli also spoke in similar vein, and Mr. Godfrey Isaacs briefly replied on behalf of the company. Capt. Cecil Norton then proposed the health of Com. Marconi, which was enthusiastically received, with musical honours. Mr. Marconi, in reply, expressed his gratitude for the manner in which the toast had been received. Herr Bredow proposed the health of Mr. Isaacs, the organiser of the company's world-wide business, who responded. Dr. Webster made a clever and humorous speech, commenting on the extraordinary change effected by Mr. Marconi in 15 years, and Messrs. da Silva and Pullino, and the Mayor of Chelmsford, also took part in wishing success to the company. In every respect the occasion was a memorable one, and the function a notable success.

To-day the delegates are to go to Falmouth, and to-morrow they will visit the Marconi Co.'s wireless station at Poldhu, afterwards proceeding to Truro on Sunday and returning to London in the evening. Next week Sir H. Babington Smith and the British delegates will give a dinner to the visiting delegates at the Hotel Great Central.

PARLIAMENTARY.

Brighton and Hove Tramways Bills.

Having passed the House of Lords' Committee, the Bills promoted by the Brighton and the Hove Corporations came on June 20th before Sir W. H. Davies' Committee of the House of Commons. Mr. H. Lloyd, K.C., Mr. G. J. Talbot, K.C., and Mr. Clode represented the Brighton Corporation; Mr. Balfour Browne, K.C., Mr. J. W. Fitzgerald, K.C., and Mr. Tyldesley Jones the Hove Corporation; and Mr. C. C. Hutchinson, K.C., and Mr. Lynden Macassey the British Electric Traction Co., who opposed.

Mr. Lloyd, K.C., explained that when the Bills were before the House of Lords' Committee there were two other schemes, one by the British Electric Traction Co., and the other by the Brighton and Hove Omnibus Co. The latter came to an arrangement with the Brighton Corporation, and the Bill was withdrawn, whilst the Committee rejected the Bill of the British Electric Traction Co. The House of Lords' Committee decided that the trackless trolley system was the most suited for the district, and it was arranged that the Brighton and Hove Corporations should each install their own system, and would by mutual agreement work in harmony and run over each other's systems. The only opposition now came from the British Electric Traction Co., who owned a horse tramway at Hove, and who wished to electrify and considerably extend that tramway. He contended that the tramway company had allowed their line to become derelict, and had only a strategical line with a view to harrassing the Corporation, and of trying to get into Brighton, where the Corporation was the tramway authority.

Alderman Geere, the Deputy Mayor of Brighton, gave evidence in support of the Bill. He said that the Corporation had no idea of continuing a motor-'bus service, but would run 'buses as feeders to the tramway system. The Committee could be satisfied that there was no intention of running 'buses and not constructing the trackless system.

Evidence was also given by Alderman Wilson, and by Mr. Hamilton, the general manager of the Leeds City Tramways.

Mr. Balfour Browne, K.C., opened the case for the Hove Bill, and said that the only complication was the existence of the tramway which the Corporation asked for power to clear away.

Alderman Marks, the Mayor of Hove, was called in support of the Bill, and said that it would be open to the Tramway Co. to electrify that portion of their line which was outside the borough of Hove. If that was done, passengers using it could then change on to the Hove trackless trolleys.

In cross-examination by Mr. Hutchison, Witness admitted that the Hove Corporation had always opposed tramways through Hove. They objected to the rails through the streets. He agreed that Hove was in a peculiar position, inasmuch as they were practically forced into a system of trackless trolleys against their will, but they were prepared to run such a system in conjunction with the Brighton Corporation, so as to be the masters of their own roads.

Questioned by the Chairman, Witness said it was essential that there should be some system of through communication, both for Brighton and Hove, but their objection to tramways was as strong as ever.

The Committee sat again on Tuesday, when further local evidence from Brighton was heard in favour of the Brighton Bill, and the Committee expressed themselves satisfied about Brighton. The Chairman said the Committee were desirous of finding out what the real feeling of the inhabitants of Hove was.

Mr. Wedderburn, K.C., who represented frontagers, said that public opinion was against the introduction of the system, except, perhaps, the provision of a through route.

The Chairman suggested that the Hove authorities might be prepared to make some pecuniary payment to the tramway company to get rid of their opposition, and Mr. Balfour Browne said his clients would be prepared to give the company the present value of the materials in the road, but Mr. Hutchinson, of the tramway company, declined to consider such an offer, which, he contended, was unreasonable. Mr. Wedderburn having called evidence in opposition to the Hove Bill, the Committee adjourned till July 5th.

North Ormesby, South Bank, Normanby and Grangetown Railless Traction Co.

On Thursday last week a Select Committee of the House of Commons, presided over by Sir J. Compton Rickett, considered the Bill promoted by this company.

Mr. Wedderburn, K.C., in opening the case, said the Bill was promoted by Sir Hugh Bell, Mr. Erasmus Darwin, and eight other gentlemen, representing various large firms in the district. There were a large number of industrial undertakings in the district, and the proposed tramway was for the convenience of the workmen who lived some distance from the works. Years ago there were no roads at all, but since then many private toll roads had been made, and a large portion of the proposed route was still private. Counsel then proceeded to give a history of the case, which, he said, went back to the year 1902, when some of the present promoters, together with the toll owners, started a Bill with the object of constructing a tramway from North Ormsby to Grangetown, and their intention was to continue the tramway to Middlesbrough. That Bill was withdrawn by the promoters on an agreement with the Imperial Tramways Co., who owned the tramways in Middlesbrough, to continue the Middlesbrough trams to Grangetown. In 1904 the company obtained powers for such extension, but from that time to this they had done absolutely nothing. They had got two extensions of time, but in 1911 Parliament refused a further extension, and so the powers had elapsed. Since the promoters of the present scheme first had the idea of a tramway in their mind, the system of railless traction had become an important factor, and now they came forward with a proposal to construct such a system 4¼ miles long. The only opposition came from the Ormesby District Council, which was asking for a contribution at the rate of ¼l. per car-mile run towards the cost of the extra expense to which they said they would be put in maintaining the roads. He should ask the Committee to follow the example of the House of Lords and refuse to give the Council the contribution they asked for. Although the trams would run for 2,248 yards in Ormesby, the Corporation would only have to repair them for a distance of 517 yards, the remainder being private. When the company was established they would have to pay rates on the whole 2,248 yards, which he estimated would amount to between £50 and £60 a year—more than sufficient to recoup the Council for any additional expense they might be put to in respect of the trams.

Evidence in support of counsel's opening was given by Mr. J. B. Hamilton, general manager of the Leeds tramways, who said that

he was perfectly satisfied that the trackless trolley system would be largely used in the future in those places where the traffic was not sufficiently heavy to warrant the equipment of an ordinary electric tramway, and after hearing further evidence, the Committee suggested that the parties should seek to come to an agreement.

After an adjournment, MR. WEDDERBURN intimated that they had been unable to come to an agreement with the Ormesby Council regarding the making up of the roads.

Having heard arguments by counsel, the Committee passed the preamble of the Bill as it stood.

Newton-in-Makerfield U.D.C. Electricity.—Viscount Wolmer asked the Under-Secretary to the Board of Trade whether he could see his way to give some indication to the Newton-in-Makerfield Urban District Council as to what conditions it would have to fulfil before it could obtain an order from the Board of Trade to proceed with its scheme for generating and supplying electricity locally, in view of the fact that the site upon which it intended to erect its plant might not be available next Session, and that the various large firms in the district would, in all probability by that time have been forced to make other arrangements.—Mr. J. M. Robertson replied that if the Council made a further application it would be necessary for them to satisfy the Board of Trade that there was a reasonable prospect of there being a sufficient number of consumers to render it unlikely that any serious burden would be imposed on the rates. The former order granted to the Council in 1903 was revoked in 1909, as the Council took no steps to give effect to it, the reason presumably being that there was no general demand for a supply. The Board did not consider that success of an electricity undertaking should be dependent upon the custom of two or three large power-users.

Keighley Corporation Bill.—On the motion for the third reading of the Keighley Corporation Bill in the House of Commons on Thursday last week, Mr. Lane Fox moved an amendment to recommit the Bill to the Committee which previously dealt with it for the purpose of considering the liability of a Corporation for alterations and maintenance of roads used by trolley vehicles.—Mr. J. M. Robertson opposed the amendment on behalf of the Government, and it was eventually withdrawn, and the Bill was read a third time.

The Lighting of the House of Commons.—In reply to Sir J. D. Rees, Mr. Wedgwood Benn says that electric light will not be substituted for gas in the Debating Chamber before the House can make a practical trial of the effect of the former illuminant on the eyes of the members. The First Commissioner is quite willing to change his views should it appear to be necessary.

Second and Third Readings.—In the House of Lords on Monday the following were read a second time:—London United Tramways Bill, and the Bognor Gas Light and Coke Co. (Electricity) Bill.

In the House of Commons on June 20th the Preston, Chorley and Horwich Tramways Bill, and on June 21st the L.C.C. (Tramways and Improvements) Bill were read a third time.

BUSINESS NOTES.

Discovery of Tungsten Deposits.—It is stated that deposits of tungsten have been discovered in the mining concession of the Société des Mines de Vaulry et Cieux, in the department of the Haute Vienne. The deposits are apparently of large extent, and have a high content of metal. The company now proposes to increase its share capital to £400,000 for the purpose of working further mines.

Illuminations at Olympia. — MESSRS. WILLIAM WHITELEY, LTD., secured the contract for the decoration of Olympia for the International Horse Show this season. The contract, which was completed in seven days, included the installing of 5,000 electric lights and 100 arc lamps in the arena.

Lamp Prices.—We learn that MESSRS. SIEMENS BROS. DYNAMO WORKS, LTD., are now in a position to supply stock orders for 200-250-volt "Wotan" lamps in 10-C.P. sizes, as well as 16-C.P. The prices of the 10-C.P. lamps have now been fixed at 3s. 6d. for pear-shaped bulbs, and 3s. 9d. for round bulbs.

Annual Sports.—The fourth annual sports meeting of the HART ACCUMULATOR CO., LTD., took place last Saturday week at the Memorial Grounds, Canning Town, E., when a good programme of cycling, running and fun events was much appreciated by about 1,000 spectators. No fewer than 178 competitors were entered for the 27 events, and the chief successes were scored by A. Yate, E. G. Warren, and T. Cook, the former being awarded a special medal as sports champion for the highest number of points obtained. He secured three successes by winning the lap, half-mile, and one mile cycle handicaps from scratch, in each case just obtaining the verdict from Warren, and second place in the 100 yards staff, and fourth in the 120 yards flat handicap; brought the champion's aggregate of points to 18, as against 17 scored by Warren. The latter, in addition to the partial successes above mentioned, won the 100 yards slow cycle and took second and fourth positions respectively in the 110 yards potato race and 100 yards staff handicap. There were, as usual, one or two "dark horses" in attendance, and the victories of G. Harding in the 120 yards and of T. Cook in the half mile and mile flat handicaps were surprises. C. R. Cartwright won chief honours in the 100 yards works flat handicap, and he also took second position in the 300 yards event when he followed J. A. Clark past the tape. Clark also took the leading place in the staff handicap, in which he showed splendid form in getting off his mark. Other winners were as follows:—One mile walking handicap, S. Robertson; 300 yards boys' flat handicap, P. Gullen; 100 yards veterans' flat handicap, S. Mears; 50 yards all fours race, T. Brightmore; 100 yards scratch boat race, F. Marsh; 100 yards scratch sack race, W. E. Taylor; tug-of-war, Team 3; one lap obstacle race, F. Grigg; 75 yards ladies' egg-and-spoon race, Mrs. Brightmore; 80 yards juvenile (girls') handicap, Miss Thompson; 80 yards (boys under 14) Master E. Edwards; 80 yards juvenile (boys under 8) Master C. Edwards. At the conclusion of a very enjoyable afternoon's sport, 78 prizes of a useful description were presented to the successful competitors by Miss N. Clark, daughter of the managing director, Mr. F. J. Holmes (works superintendent) opening this part of the proceedings with a short speech befitting the occasion. The judges in attendance were Messrs. F. J. Holmes, J. H. Poulton and W. Clark. To Mr. E. G. Warren, the hon. sec., fell the brunt of the work involved in ensuring the success of the meeting.

Annual Outings.—THE WALSALL ELECTRICAL CO., LTD., announce that their works will be closed to-morrow, Saturday, June 29th, on account of the annual outing which takes place to Llandudno.

The head office staff of W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., had a very successful and enjoyable trip on June 15th. Leaving Paddington at 9.15 a.m. in special saloons to Taplow, then proceeding by launch from "Boulter's Lock" through the well-known Clevedon and Quarry Woods, Marlow, to Harley Lock, and returning through Windsor and Staines, reaching Paddington at 10 p.m. The party, numbering 70, were photographed at Cookham Lock, and during the evening a presentation was made to Mr. W. J. Potter for the interest he had taken in this, the first launch party. There was plenty of music on board, and the catering was admirably carried out through the efforts of Mr A. J Kips.

Aluminium Prices Advance.—The INTERNATIONAL ALUMINIUM SYNDICATE has raised prices from 80 fr. to 92½ fr. per cwt. for any further contracts concluded in the present year. A proposal was made to increase the quotations to 100 fr. per cwt., but this failed to meet with general approval at the recent conference. Since then, however, the Neuhausen Aluminium Industry Co. has made a further increase to M. 77½ per cwt., and only limited quantities are on offer.

Dissolutions and Liquidations.—ARC LAMPS, LTD.—The joint liquidators (Messrs. H. B. Clark and G. E. Corfield) have just paid a first and final dividend of 1s. 10½d. in the £, and in doing so they issue a statement explaining to the creditors the apparent delay in completing the winding up and distributing the balance. The summary of receipts and expenses is as under:—Receipts: Cash received by liquidators under the terms of the assignment to the purchasers, £538. Payments: Advertising, income-tax, legal expenses, bank charges, £50; paid to purchasers in settlement of all claims *re* stock in hands of agents, £28; winding-up expenses, £29; liquidators' remuneration, £42; balance available for distribution, £389.

LONDON ELECTRIC FIRM, electrical and general engineers, 6A, George Street, Croydon.—Messrs. A. Wunderlich & G. A. Hughes have dissolved partnership. Mr. Hughes attends to debts, &c.

HEINRICH MESSMANG.—Persons who have claims upon or debts to the estate of the late H. Messmang, of Stieling, Kempten, Bavaria, should communicate by July 3rd, with Oberamtsrichter Zübert, Kempten.

SUNBEAM LAMP CO., LTD.—The adjourned meeting of creditors was held at Newcastle-on-Tyne on the 21st inst. The meeting had been adjourned in order to see if it were possible to effect a reconstruction of the company, but in the notice calling the meeting, Mr. T. Wallace, the liquidator, intimated that "the Committee appointed by the shareholders have informed me that they have come to the conclusion that it is not possible to devise any scheme of reconstruction which, under the circumstances, could be carried through."

Mr. Wallace, the liquidator, presided, and in opening the proceedings, said he was afraid that the position was not quite so rosy as when they last met. If there were sufficient to pay the debenture-holders that would be all. There would be nothing left for the shareholders or creditors, even with a forced sale.

Mr. Swan (Receiver for the debenture-holders) said that without the land and buildings, he estimated that the assets were worth about £15,000. That was not enough to pay off the debentures, to do which £20,000 would be required. In reply to a creditor, he added that with a forced sale there could be nothing left for either the shareholders or the creditors. The scheme which they had had in mind would not have been a perfectly satisfactory business. Something between £30,000 and £50,000 would have been necessary to launch it, and they would have had to depend on the debenture-holders to join in with their money. The majority of the latter, however, had come to a decision that meant that they wanted their money out. He had not been able to find the money for that purpose, and the chance of the liquidator getting any was nil. The plant on the premises was largely for the lamp-making trade.

Mr. Scholey asked if it were suitable for any lamp trade?—Mr. Swan said the plant might not be suitable for any other lamp trade. Mr. Scholey pointed to the fact that last year the company paid a dividend of 5 per cent., and urged the necessity of the appointment of an independent liquidator and a committee of

inspection. Would it not be possible, he asked, to sell the whole business as a going concern?—Mr. Swan said there was a chance of selling part of the concern, but it was only a question of about £200.

Mr. Perkins (representing the Westinghouse Co.) said it was an extremely unsatisfactory business. He agreed as to the desirability of the appointment of an independent liquidator. The creditors to the number of 20 had had a meeting in London, and he was instructed to move that a joint liquidator be appointed, as well as a committee of inspection representing the largest creditors; and that an application be made to the Courts for compulsory winding-up. He moved that Mr. G. E. Corfield, of London, be appointed joint liquidator with Mr. Wallace, that a Committee of five be appointed, and that the application to the Court be made by the Sterling Telephone Co.—Mr. W. Sodon Bird seconded the resolution.

The Liquidator, in reply to Mr. Russ who asked how the loss of £6,000 last year was made up, replied that £3,000 was by trading, and £3,000 by stock.

Mr. Perkins's motion was then put to the meeting, and five voted in favour of it and three against, 18 being neutral.

Mr. Scholey asked the chairman to declare the motion carried, but the chairman declined. Mr. Scholey then moved that another chairman be appointed. After some further discussion, the chairman declared the resolution carried on a show of hands, but declined to sign it. However, eventually, after an appeal by Mr. Perkins, the chairman signed the resolution.

The Committee of Inspection was then appointed as follows:—Mr. K. Kornfeld, Westinghouse Co.; Mr. Jos. Wilson, Blaydon Manure Co.; Mr. J. Russ, Messrs. J. & H. Grevener; Mr. H. F. Marchant, Armorduct Co., Ltd.; and Mr. H. Morton, Messrs. Berry, Skinner & Co.

Trade Announcements. — Mr. Robert H. Lasch having resigned his position as chairman and managing director of the Selson Engineering Co., Ltd., Mr. Henry M. Sonnenthal has been appointed in his place. Messrs. John M. Kadisch and Arthur Lord have joined the board of directors. The business will be carried on as heretofore.

MESSRS. EDWARD WILCOX & CO., electrical engineers and contractors, have changed their name to Willoughby & Wilcox. Their office and works are at Central Buildings, Trafford Road, Salford, with showroom and sales department at 161, Trafford Road, Salford.

We understand that MESSRS. WILLIAM MCGEOCH & CO., LTD., ships' brassfounders, lamp makers and electrical engineers, of Glasgow, Birmingham and London, are transferring their premises from Baltic Chambers, Sunderland, to 30, Cloth Market, Newcastle-on-Tyne, as from July 1st. Mr. Philip Lodwidge, who has been their representative in the Newcastle district for many years past, is retiring from business. The new branch will be under the charge of Mr. R. W. Waddle, who has for many years assisted Mr. Lodwidge.

MESSRS. PIRELLI, LTD., removed on 24th inst. to larger premises at 144, Queen Victoria Street, E.C., and 14, Knightrider Street, E.C., and all correspondence should be addressed to them there.

Meters Approved.—The *London Gazette* contains notice of approval given by the Board of Trade to the following meters deposited by MESSRS. CHAMBERLAIN & HOOKHAM, LTD.:—C. & H. prepayment meter, type C.P. 2; C. & H. A.C. prepayment meter, type A.P. 1.

Western Canada.—In a recent report the Imperial Trade Correspondent at Calgary (Mr. J. W. Hugill) points out that it is essential that British firms with any intention of doing business in Western Canada should bear in mind the prospective cheapening of transportation with the opening of the Panama Canal, and they should get on the spot at the earliest opportunity. These remarks refer more particularly to the heavier and rougher class of products, such as steel pipes, which are in demand for the municipal authorities at Calgary and other cities. It is purely a question of price, it being recognised that the British-made article is more durable and of better average quality than that made in the United States for the same purpose, and is preferred in consequence, if the delivered price will permit of a preference being shown.

The Imperial Trade Correspondent at Edmonton, Alberta (Mr. F. T. Fisher) considers that the opportunity for United Kingdom manufacturers to get business there is constantly improving. In the past, owing to the limitations of the market, the consumption of many classes of British-made goods was too limited to permit of direct shipment in car-load lots, and merchants got their supplies of such goods through middlemen in Montreal, Winnipeg, or Vancouver. Owing to the growing importance of the market, it is constantly getting easier for wholesalers at Edmonton to buy car-loads for direct shipment. The prospects for the future suggest an even more rapid development in Alberta than in the past, with a larger consumption of all kinds of goods, and that market will become of vastly more value each year. At the same time, wholesalers and importers are gradually wresting the trade away from importers at the older and larger Canadian ports of entry. The building trades promise to be particularly active during 1912, it being estimated that building operations in Edmonton alone will aggregate over seven million dollars. This will involve the use of considerable quantities of structural steel, galvanised sheet iron, sanitary fittings, heating boilers and radiators, steam pipes, &c. A most active era of railway construction is in sight, with Edmonton as its centre. It is expected that the construction of something like 2,000 miles of branch lines will be arranged for during the present session of the Alberta Legislature, and consequently a large amount of construction supplies and bridge material will be needed. Development in the coal industry also promises to be very active. While the production of coal in and around Edmonton has increased in the last dozen years from about 100 tons to 3,000 tons per day, it is still only a fraction of what the accessible market would consume. A considerable amount of new equipment, including hoisting machinery, cables, &c., is being installed, both in new mines and in many of those previously worked.

Very extensive additions to all the public services in Edmonton, such as water supply, sewers, electric light, &c., are proposed, the expenditure of something like six million dollars being contemplated. There is similar activity on a smaller scale in many of the other towns, which will lead to a demand for steel or iron pipe, engines, boilers, pumps, electrical equipment, &c.—*Board of Trade Journal.*

Bankruptcy Proceedings. — ARCHIBALD FRANK MANDERS (trading as Mander Brothers, and lately trading as A. F. Manders, late 62, Victoria Road, and 258, Lozells Road, Aston, Birmingham, electrical engineer, &c.).—An application was made to his Honour Judge Amphlett, sitting at the Court House, Corporation Street, Birmingham, last week, for the discharge from bankruptcy of the above-named debtor. The Official Receiver stated that the receiving order was made in February, 1908. From the statement of affairs, the liabilities to rank for dividend were estimated at £256, but the proofs actually admitted to date amounted to £181, and the probable claims not yet admitted amounted to £143, making a total of £324. The assets realised a sum which only met the costs incidental to the bankruptcy, and consequently no dividend had been paid. Mr. Povey-Harper, for the debtor, said his client found the electrical business and the cycle business carried on under different roofs were more than he could cope with. His Honour said there had been a good deal of rash and hazardous trading, but there were exceptional circumstances, in that the debtor got into the immediate trouble by the breach of contract on the part of his manager. As the debtor was willing to consent to a judgment for £30, payable by monthly instalments of £10, there was no reason why the discharge should not be granted, subject to that undertaking being carried out.

G. E. HERVEY, gas and electrical engineer, and ironmonger, Eastbourne.—First meeting July 2nd, at Brighton; public examination, July 16th at Eastbourne.

OLIVER HUXLEY, consulting engineer, 120, Coldershaw Road, Ealing.—Receiving order made June 21st, at Brentford, on a creditor's petition.

H. E. SCARBOROUGH, electrical and mechanical engineer, Halifax.—Application for debtor's discharge is to be heard on July 29th.

Catalogues and Lists.—MESSRS. VERITYS, LTD., 31, King Street, Covent Garden, London, W.C.—Two new pamphlets have been issued. No. 667 (24 pages) contains full particulars, including much tabulated data and prices of "Aston" wires and cables (600 and 2,500-megohm grades), also cab-tire sheathed cables, aerial wires and cables, electrolier wires and flexible cords, telephone cables and wires, &c. List No. 677 (four pages) shows and gives reduced prices of a number of types of "Aston" desk fans ("Typhoon" and "Delhi" types), also D.C. ventilating fans.

MESSRS. SIMPLEX CONDUITS, LTD., Birmingham.—Neat illustration price card relating to their electric toaster. Quantities of these cards can be supplied to contractors and central stations with appropriate name printing.

THE SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, London, W.C.—Eight-page pamphlet containing descriptive particulars, with illustrations, diagrams and prices of Thermo-blink flashers, magnetic mercury-contact type sign flashers, motor-driven flashers, and other lines for electric advertising and other sign purposes.

MESSRS. UNION ELECTRIC CO., LTD., Park Street, Southwark, London, S.E.—Twelve-page pamphlet entitled "Factory Lighting at Half the Cost," dealing with the "Kohinoor" semi-enclosed arc lamp, and its suitability for the lighting of small factories and increased efficiency compared with metal-filament lamp lighting.

MR. H. M. TURNER, Nutsford Vale Works, Manchester.—Folder and postcard illustrations of a portable quick baking oven for drying armatures, field coils and electrical materials and work generally. It is stated that any armature or other work less than 17½ in. in diameter may be baked in the oven in less than three hours. The oven, with its cover removed, can be used for shop-warming purposes.

MESSRS. COX-WALKERS, LTD., Darlington.—Two leaflets, one showing the new protected pattern "C.W." electric head lamp for motor-cycles and cars, the other giving particulars of a world's record ride of 3,008 miles in six days with one of these lamps, which gave not the least trouble.

MESSRS. SIEMENS BROS. & CO., LTD., Woolwich, Kent.—Catalogue No. 533 (16 pages), in which are given full particulars of the Siemens electrical water-level signalling apparatus, transmitters, indicators (with and without recording device), bell switches, telephones with buzzer call, accessories and parts—all of these are well illustrated, and prices are plainly set out, while diagrams of connections, inquiry forms and a telegraphic code are given at the end.

THE FOSTER ENGINEERING CO., LTD., Wimbledon.—Price list of Beck flame arc lamps of D.C. and A.C., single and double-carbon types, prices of carbons, choking coils and resistances are also clearly tabulated.

MESSRS. ABERCROMBIE & SON, 36, Whitfield Street, London, W.—Eight-page reprint relating to some excellent "Adams" and Sheraton candle brackets and pendants, also a Chippendale bowl light for reflected lighting.

THE ELECTRICAL TRADES SUPPLY, LTD., Britannia Works, Great Charles Street, Birmingham.—Switchgear catalogue of 48 pages.

The contents are very fully illustrated, and prices are clearly given in tabular form. The manufactures described include various types of switches for lighting, traction and power work, wall plugs and sockets of ironclad and Home Office patterns, distribution fuseboards, circuit-breakers, controllers, Igranic motor-starters, lightning arresters, shunt regulators, and ammeters and voltmeters.

MESSRS. W. T. GLOVER & CO., LTD., Trafford Park, Manchester.—The company has just issued its new Rubber List, No. 10, which consists of some 90 and more pages of neatly-arranged tabular matter, bound in a strong cover. There is a thumb index to the different sections which deal respectively with:—Details of conductors; "Association" and "non-Association" single and twin vulcanised wires and cables, pure rubber wires and cables, trailing cables, vulcanised concentric cables, aerial cables and suspenders, twin flexible cords and cables, motor-car flexibles, resistance wires, &c. The concluding pages are devoted to conversion tables and useful formulæ.

THE QUEEN'S ENGINEERING CO., 60, Queen's Road, Battersea, London, S.W.—Leaflet describing and giving prices of the "Halso" box-blade fans and belt-driven fans. Both fans and electric motors are built at the firm's works at Battersea.

THE ELECTRIC CONSTRUCTION CO., LTD, 9, New Broad Street, London, E.C.—New illustrated sheet (B/299), giving a description of the firm's oil-immersed auto-transformer starter for two or three-phase motors.

THE SANDYCROFT FOUNDRY CO., LTD., Sandycroft, near Chester.—List giving particulars of the "Sandycroft" storage battery, which is the outcome of a long series of experiments carried through by their predecessors, the Epstein Accumulator Co., Ltd., and themselves. Pictures of plates and of complete batteries as installed are included,

THE BRITISH THOMSON-HOUSTON CO., LTD., Rugby.—70-page catalogue (No. 354), printed on art paper throughout, giving a great deal of illustrated information relating to Curtis turbo-alternators. The contents are divided up into six sections, thus:—(1) General; (2) high-pressure turbines; (3) low-pressure steam turbines (mixed-pressure type); (4) turbine-driven alternators; (5) reducing turbines; (6) small turbines. Throughout these sections there are half-tone views of complete turbo plants, parts of machines, explanatory diagrams and sectional drawings and curves. We understand that the sales of Curtis turbo-alternators to municipalities, H.M. Government, tramway, power and railway companies, &c., aggregate over 228,609 KW. Doubtless power station engineers at home and abroad will find much of interest in this catalogue.

MESSRS. GALSWORTHY, LTD., of 15 and 16, Newman Street, Oxford Street, London, W., will send a copy of their new electric light fittings list to any firm not yet supplied, on application.

British and Foreign Tenders for Cables.—At a meeting of the Southwark Borough Council on the 20th inst., Alderman Hewitt proposed that it be an instruction to the Electric Light Committee that, with respect to all future purchases of cable, quotations be obtained only from firms whose works are situated in Great Britain, and who undertake to manufacture the cable in their own works. He said it was desirable that all cable should be manufactured by British firms. The Committee had a great deal of difficulty when the lowest tender happened to be from a foreign firm, as the Council had laid down very stringent regulations as to Trade Union conditions, and if they gave tenders to firms abroad, it was impossible to see that these conditions were carried out. Councillor Bird, in seconding, held that the resolution, if carried, would not "set up rings," but would give the finest scope to British enterprise that was possible. Councillor J. O. Devereux said that, whilst he agreed that work should be given to the Britisher, he could not be a party to paying the same prices as the London County Council, who had to pay 75 per cent. more than the foreigners' price to the ring of English manufacturers. Councillor B. W. Williams moved, as an amendment, that all contracts be advertised for in open tenders. He said the electricity undertaking was a purely business concern, and was the property of the Council. Would those who proposed to restrict the tenders on the lines suggested apply the same rule to their private businesses? Of course not; they would buy in the cheapest market. Councillor Haworth, in seconding, said that to throw the tenders open was the only way to keep clear of "the rings." The amendment proposed by Councillor Williams was carried by 29 votes to 18.

Glover's Almanac.—We are reminded of the lapse of time—*Ehen! fugaces*—by the receipt of this periodical, which is unique, in that every page of it represents the exercise of industry and careful discrimination in the choice of an appropriate and useful or entertaining extract from the technical Press, the proceedings of Societies, or the inner consciousness of Glover's staff. Many a useful hint or timely reminder will be brought to the notice of the engineer who keeps it at hand, and the inscriptions on the leaflet of July 1st, in the familiar handwriting of one of our valued correspondents, bring back to us the hours we have spent in trying to decipher it. The electrical profession is indebted to MESSRS. W. T. GLOVER & CO. for this annual collection of engineering scraps.

Belgium.—A company has just been formed in Brussels with a capital of £24,000, and the title La Société Belge de Telephonie Perfectionée, to exploit a new automatic telephonic system.

Lamp Varnishing.—We have received from MESSRS. SIEMENS BROS. DYNAMO WORKS, LTD., of Dalston, a post-card showing an illustration of a lamp which had been varnished in the ordinary manner on one side, but on the other side by a special process which has been developed by the firm. The picture shows that lamps varnished under this new process do not flake when subjected to weather conditions, and to heating effect, whilst the ordinary method used is not at all satisfactory. The illustration of the lamp was taken from an untouched photograph of a carbon-filament lamp after it had been on circuit some months to test the lasting qualities of the various systems. The method can be applied to "Wotan," tantalum, or carbon-filament lamps, and we are informed the colours will remain fast for a very long period. It is also possible to match any shade of colour or delicate tint, which is important when working out colour schemes for decoration purposes.

Trade Openings in Denmark.—MESSRS. AAGE HAVEMANN'S EFTF (Chr. A. Olsen), of Kjobenhavn (Admiralgade, 16, Hj. Af Fortunstræde) in a communication just received by us, say:—"We are one of the biggest wholesale supply houses in the electrical line in Denmark, and as Denmark is manufacturing very little in this line, we have to look to the manufacturing countries around us to find our sources of supply. Now Germany has for many years been gaining a very strong foothold on the Danish market owing partly to her being our next door neighbour, and partly to her excellent products and her energetic ways of going after the business and studying our special conditions with a view of adapting her products to our needs. We feel, however, that English manufacturers once convinced that it was worth their while would be just as willing to make a few sacrifices in order to get their share of our business, and it is with this in mind that we are writing to you to-day feeling certain that you would like to help us in making some more connections with first-class English manufacturers, thereby serving the interest of some of your many friends and subscribers." Our correspondents then briefly outline their proposal, which is that English manufacturers should send a sample and description of electrical devices with export prices f.o.b. Hull, for investigation. Such samples as are thought suitable for the market will be sent to the municipal testing commission for trial and approval, and thereafter an effort would be made to secure business in the manufactures. Any of our firms interested in the matter are invited to communicate with the firm.

Book Notices.—*Patents and their Exploitation.* By H. A. Gill and R. Ellis.—This is a little pamphlet giving briefly the main facts relating to patents, designs and trade marks, issued by the authors at 55, Chancery Lane, W.C.

A catalogue of books on engineering and allied subjects in the Bolton Public Libraries has been sent us by the chief librarian, Mr. Archibald Sparke: it is arranged mainly on the Dewey decimal system, and is a model of ease of reference, while the collection of books comprises most of the best works, including many issued in 1911 and 1912. Some of the headings on the Dewey system produce curious effects—for example, "602 Compendiums," "621·39 Applications of Electricity"; and the division of electrical subjects into "Heavy Current Engineering" and "Weak Current Engineering," after the German method, is dangerous, for in this case the latter heading is followed not only by telephony and telegraphy, but also by sections on electricity in workshops and in mining and metallurgy—the last-named employing probably the strongest currents known to electrical engineering—while electrostatic apparatus and induction coils are found associated with the former class. But these are minor defects; a technical library is useless unless it is well arranged, and above all, up-to-date, and we are glad to see these principles followed at Bolton.

"Prospectus of the Working Men's College, Melbourne." 1912. Melbourne: The College.

"Fortschritte der Elektrotechnik." By Dr. Karl Strecker. 1912. Berlin: Julius Springer. Price 9 M.

"*Transactions* of the University of Toronto Engineering Society." May, 1912. Toronto: The Society.

"Report of the Council of the City and Guilds of London Institute, 1912." London: 3, St. Helen's Place, E.C.

"*Journal* of the Franklin Institute." Vol. CLXXIII, No. 6. June, 1912. Philadelphia, Pa.: The Institute. Price 50 cents.

"Bulletin of the Association des Ingenieurs Electriciens." March, 1912. Liége: The Association. Price 8 fr.

Diesel Works at Ipswich.—THE DIESEL ENGINE CO., LTD., has definitely decided to erect extensive new works at Ipswich, as recently foreshadowed in the ELECTRICAL REVIEW. A site of 20 acres has been secured from the T.C., with an option upon another 20 acres, and workshops large enough to employ over 1,000 men are to be erected. The cost of the works and equipment will approach £200,000.

Germany.—The manufacture of sparking plugs for petrol motor-cars has lately been taken up by Messrs. Siemens & Halske, of Berlin.

LIGHTING and POWER NOTES.

Argentina.—It is reported from San Juan that a contract has been signed for the sale of a waterfall on the San Juan River to an English syndicate formed by Messrs. Howard, Bowen and Co., of London. The syndicate has a capital of $2,700,000 for the installation of hydro-electric works.—*Review of the River Plate.*

Bath.—The accounts of the Electricity Department disclose a net loss on the year's working of £1,521, as compared with £1,196 in the year 1910-11, while in the previous year the loss was only £580. The gross profits on the undertaking, however, show an increase. In 1909-10 a balance of £9,186 was brought from the revenue account; in 1910-11 the amount had increased to £9,708, and this year the figure of £9,885 was reached. The total charges to be met by the gross profit increased from £10,940 in 1910-11, to £11,407 in 1911-12. The total expenditure was £11,329, as compared with £10,718 the previous year; while the total income increased from £20,435 to £21,247.

Bolton.—The application of the Corporation for sanction to borrow £45,000 has been the subject of an inquiry by the L.G.B. In reference to the item of £20,000 for electric lighting purposes, the borough electrical engineer (Mr. A. A. Day) explained that this was required for the laying of cables and service mains to cover the next three years. No opposition was raised to the proposals.

Brazil.—The Brazilian Government has granted a concession to the firms of Valle, Rodrique & Romos, of London, and Bromberk, Hacker & Co., of Rio de Janeiro, to utilise the water-power of the Paulo Alfonso Falls on the San Francisco River. The concession is for a period of 70 years. The output of the installation will total 200,000 H.P., gradually increasing within a period of 15 years to 1,300,000 H.P.—*Zeit. fur das Gesamte Turbinenwesen.*

China.—The *Indian Textile Journal* recently quoted a Consular report giving particulars of the first mill in China operated by its own electrical plant. The mill, situated in Shanghai, is owned by a Japanese Co., and spins cotton yarn; the power house contains two Belliss triple-expansion engines coupled to Siemens dynamos each of 600 KW. output, and ultimately 40,000 spindles will be installed in the mill.

A central electric lighting station has recently been completed in the Embassy quarter of Pekin. The plant, which was supplied by the A.E.G., of Berlin, through Messrs. Arnhold, Karberg & Co., comprises three Körting 80-H.P. suction-gas engines directly coupled to 112·5-ampere 240-volt generators, and a similar set, but of 240-volt 208-ampere capacity. The plant is run by the Pekin Electric Co., Ltd., which, though registered in Hong Kong, is a German undertaking.

Continental Notes.—GERMANY.—The experiments made by the Electric Uberlandcentral at Mülhausen, in Thuringia, to adapt electric driving to the numerous spinning mills in the Eichsfeld district have yielded good results, and a tariff has been fixed on the basis of a guaranteed number of KW.-hours at a moderate price that will both induce current consumption and favour the industry.—*Elektrotechnische Nachrichten.*

Reviewing the official statistics for 1909-10 of the operation of the 296 German gasworks and the electrical companies, *Der Elektrotechniker* observes:—A comparison of the yearly output of the gas establishments in Germany with the output of the electric companies gives the following results:—The gasworks in Germany up to date have produced about 2,400 million cubic metres of gas. The public electric stations have furnished 2,150 million KW.-hours. Whence it follows that the latter to-day yield almost as much as the existing gasworks which have been in existence for 86 years, although the electric undertakings have only been established 30 years. This means a victory of electricity over gas, which must go on increasing. Notwithstanding all the improvements effected, gas can only continue the struggle by dint of its by and secondary products.

An agreement has been come to between the A.E.G. and the T.C. of Saarbrücken for the establishment of an electric power station in the Saar coalfields, and the supply of the rural communes in the district. Of the capital of the company to be formed, the T.C. will subscribe about one-half, the balance being furnished by the communes, the A.E.G. and the Berlin-Anhaltische Maschinenbau Gesellschaft.

FRANCE.—The *Journal Officiel* of June 8th contains decrees authorising (1) the Chamber of Commerce of Havre to borrow and expend a sum of 1,530,000 fr. for the provision of 15 electric cranes on the Pondicherry Quay, and two electric cranes on the Renaud Quay, at the port of Havre; (2) the Chamber of Commerce of Dunkerque to borrow and expend a sum of 1,020,000 fr. to acquire 19 electric cranes and electric capstans to complete the machinery at that port; (3) the Chamber of Commerce of Rochelle to borrow and spend a sum of 350,000 fr. for the installation at Rochelle Pallice of four electric cranes, with accessories, an electric sub-station, and other apparatus.

SPAIN.—La Societé de l'Energie Electrique du Centre de l'Espagnie is the name of a new company which has lately been formed in Paris with a capital of £80,000.

BELGIUM.—La Société des Charbonnages de Ressaix, of Ressaix-lez-Binche, has decided to establish an electric lighting and power plant at its collieries at Genck (Lembourg). The plant will comprise two 2,000-KW. steam turbines and generators.

RUSSIA.—One of the principal electric lighting companies in St. Petersburg is reported to have decided to put down a plant to utilise the water-power of the Imatra Falls. It is stated that no less than 50,000 H.P. will be available.

Epsom.—The L.G.B. has written to the U.D.C. asking for particulars of that body's proposal to extend its electricity mains to Ewell, and stating that a local inquiry will be held into the Council's application for sanction to borrow £4,221 for the purpose.

Erith.—The U.D.C. has decided to offer a supply of energy to Messrs. Vickers, Ltd., for their factory and workshops at 1d. per unit. The company asked for a figure less than 1d. per unit on a consumption of about 2,000,000 units per annum, with a maximum demand of 800 KW.

Falkirk.—A long discussion has taken place at the T.C. as to whether the Corporation should oppose the Falkirk and Linlithgow electric lighting order in its remaining stages, the B. of T. having intimated that it did not consider it necessary to include in the measure the protective clauses for which the Corporation asked. On a vote, it was agreed to oppose the order.

Finchley.—From the report of the electrical engineer on the undertaking for the year ended March 31st last, it appears that the "profit on the year's trading amounted to £491. The number of units generated was 1,540,000, of which 79·1 per cent. was for private lighting, 5·7 per cent. for power, and 15·2 per cent. for public lighting, while those sold were put at 1,173,029, 175,920 being entered as mains loss and unaccounted for. The works cost per unit sold was 1·6d." Councillor Syrett, in moving the adoption of the report at the last Council meeting, stated that 9,289,000 gallons of water had been drawn from the well at the electricity works, this representing a saving of £400, which, on a capital charge of £1,500, he considered a good return. The number of consumers amount to about 3,000. The balance carried to the net revenue account was £9,483, as compared with £9,184 in 1911. Discussion on the report was adjourned.

Fleetwood.—At the Council meeting, on June 20th, Mr. Whiteside mentioned that the Council's electricity undertaking had made a net profit during the year of £460. Of this amount it had been decided to place £140 to reserve, and transfer the balance to the improvement rate. The total expenditure of the department during the year was £6,021.

For the sum of £1,500 the Electricity Committee has agreed to undertake the lighting of the streets for the year ending March 31st, 1913.

Greenock.—In the agreement arrived at between Greenock and Port Glasgow Corporations on the question of the supply of electricity to power users in Port Glasgow, it is stipulated that "Greenock Corporation withdraw all prohibition as to Port Glasgow laying down generating works of its own, or purchasing a supply from any other authority."

Halifax.—The profit earned by the electricity department for the year ending March 31st amounted to £2,174, but had it not been for payments of £4,737 for special work, the profit would have been £6,911, compared with £5,322 in the previous year.

Hastings.—The T.C. on June 21st decided to extend the mains so as to supply current to All Souls' Church, at a cost of £304. *En route* 15 gas lamps will be converted to electric lighting.

Hazel Grove.—Mr. H. C. Crews, consulting engineer, of Manchester, has been instructed by the Electricity Committee of the Hazel Grove and Bramhall Urban Council to prepare a report and scheme for supplying electrical energy in the Council's area.

Lincoln.—The returns for the last year's working of the Electricity Department show that 1,840,167 units were sold, or some 20,000 in excess of the previous year. Power and traction supply accounted for over 1,200,000 units, and Messrs. Clayton and Shuttleworth alone took over three-quarters of a million units. The total revenue amounted to £13,315, and the gross and net profits to £6,950 and £3,034 respectively. The works cost amounted to ·62d. per unit, and the total cost (including financial charges) to 1·34d. The average price for all supply was 1·72d. per unit, the supply to Messrs Clayton & Shuttleworth averaging ·682d. per unit. The undertaking has a depreciation fund of £9,256.

London.—ISLINGTON.—According to the accounts of the electricity undertaking for the year ended March 31st last, it appears that the surplus available to be carried to the reserve fund after payment of interest on, and repayment of, loans, is £3,989, which is practically the same as last year (£4,076). The total number of units sold amounted to 6,416,953, as against 5,793,599 in 1911, while the total average cost per unit was 1·93d., compared with 2·01d. Regarding the revenue account there was an expenditure of £29,953, as against an income of £58,839, leaving a net balance of £28,885 (as against £27,974 last year). Of the former amount £3,167 went towards repairs and maintenance. The power load continued to increase satisfactorily; the number of units sold at, or under a penny, having increased from 1,936,322, yielding an income of £7,984 in 1910-11, to 2,261,482, yielding £9,423 during the year under review. £9,766 was realised from the sale of units at 3d. per unit, nearly £6,000 of which was contributed by places of entertainment. For the first time in the history of the undertaking the works costs were below 1d. per unit and the total cost below 2d. per unit. The number of consumers had increased form 3,354 to 3,566, and the total equivalent of 30-watt lamps was 29,868, or an increase amounting to 996 KW.; 119 motors totalling 738 H.P. had been connected and the equivalent of 105 KW. for radiators and cooking. The remaining increase is accounted for by 264 KW. in lighting, and the increase in public lighting during the year amounted to 12 KW. The miles of frontage of mains had been increased to a total of 59 miles 835 yards, representing an increase of

three miles. The maximum load on the station was 4,218 KW. The engineer states that whilst the progress of the undertaking and the accounts can be viewed as very satisfactory, he is of opinion that if the undertaking is to obtain its full measure of success, consideration will have to be given to the further development of the business on lines which are being largely adopted by other electric lighting undertakings, and such policy will be essential if the popularising of electricity for domestic purposes is to be achieved. The Cooking Exhibition, which was held during the past year, resulted in the adoption of electrical cookers, but their general use is handicapped by the fact that it is the practice of the gas companies to hire out such apparatus. The purchase of gas stoves by the consumer is very limited, and the general use of electrical cooking isprevented by the department being unable to let out the apparatus on hire.

HAMMERSMITH.—Application is to be made to the L.C.C. for £3,775, being the balance of the loan sanctioned by the Council in 1911.

CITY.—The Corporation has had under consideration the question of exercising in the near future its powers to purchase so much of the undertakings of the City of London Electric Lighting Co., and of the Charing Cross Electricity Supply Co., as relates to the City. In a report presented to the Court of Common Council by the Streets Committee the opinion was expressed that it would be inexpedient to take any steps in the matter at the present time, and that such rights of purchase should not be exercised in 1914 or 1915.

Loughborough.—The T.C. has decided to apply to the L.G.B. for a loan of £10,238, required for extensions necessary through the arrangement to supply current to the Brush Electrical Engineering Co., whose minimum annual consumption will be 1,600,000 units. The total capital outlay will be about £15,000, and the company will provide plant to the value of £4,762, to be paid for by instalments covering a period of 10 years.

Merthyr Tydfil.—The Public Works Committee of the T.C. has decided by seven votes to four not to further extend the period for the purchase by the Corporation of the lighting and tramway undertakings for the Merthyr Traction Co.

Peterboro'.—The T.C. has decided to fit all the public electric lamps with automatic time switches, at a total estimated cost of £237.

Preston.—The Streets and Buildings Committee has been recommended, and has decided, that as an experiment Stanley Street be lighted by metal filament lamps at a cost not exceeding £70.

Rangoon.—A correspondent writes that a wealthy resident of Rangoon is bearing the cost of the electrical installation of the famous Shwe Dagon Pagoda, and the work has been undertaken by Messrs. Siemens Bros. Dynamo Works at a cost of Rs. 16,000. A large number of 100-C.P. metal lamps will light up the staircases, and the platform, on which also will be lamps of 2,000 C.P., suspended from steel lattice towers 85 ft. high. There are also four searchlights of 7,000 C.P., which will be used to throw light on the magnificient building itself, rendering it visible for many miles round.

Rawtenstall.—A L.G.B. inquiry has been held into the application of the Corporation for sanction to borrow amongst other sums, £7,500 for the extension of the electricity undertaking. In the course of the inquiry the Inspector said he was glad to notice that the Corporation was placing the profits from the electricity undertaking to the reserve fund.

Stirling.—The surplus in the Corporation electric lighting department for the year amounted to £526. This sum it has been agreed to add to the reserve fund, which now amounts to £1,815.

The County Council has consented to the T.C. supplying electricity for purposes other than power in the Park Place district.

San Domingo.—A contract has been signed by the magistrate of the city of San Domingo and the banker S. Michelena for the formation of an electricity company, styled the Electra Dominica. The share capital of the company is fixed at $160,000, $60,000 of which will be subscribed by the city. The company contemplates building a central station, and to supply current for street lighting, private consumption and industrial purposes. The contract is for a period of 50 years, when the entire plant becomes the property of the municipality.—*Elek u. Masch.*

Tunbridge Wells.—The accounts of the electricity department for the year ended March last, show a total revenue of £14,867 and £6,793 carried to the net revenue account. Loan contributions, interest, &c., absorbed £5,954, and the balance of £839 was placed to the appropriation account—the reserve fund (amounting to £6,097) benefiting to a small extent. During the year 1,215,330 units were generated, and 896,143 sold, including 247,000 estimated as being supplied to public lamps.

Whitchurch (Cardiff).—The electric light undertaking had a deficiency of £419 only, as the result of the first year's working.

Yarmouth.—The gross trading profit on the undertaking for the year ended March 31st last amounted to £9,191. Of this amount £702 was written off the cost of new meters, transformers and other works, including part cost of altering the system of public street lighting, which is being charged to revenue; £7,898 applied to interest, sinking fund, rebates and discounts, and £590 added to appropriation account.

TRAMWAY and RAILWAY NOTES.

Ardsley (East and West).—At a recent Council meeting it was resolved to urge on the Wakefield Corporation that the three authorities, namely, Wakefield, Ardsley and Stanley, who were successful in opposing the application of the Wakefield and District Light Railway Co. (part of the West Yorkshire Light Railway Co.) for permission to drop the Ardsley and Stanley extensions, should now take steps to hurry the Light Railway Co. on with the scheme.

Continental Notes.—AUSTRIA.—The Austrian Ministry of Railways has just granted a concession for the construction of an express electric railway from Vienna to Brunn, a distance of 210 km., which is planned to be covered at the speed of 120 km. an hour. The line is mainly for express passenger traffic—goods and ordinary traffic being separately catered for. The trains will consist of an engine and two passenger coaches, carrying 50 passengers each. Current will be drawn from the Vienna Central municipal power house. The cost of the line is put at 28,000,000 kronen.

PORTUGAL.—A Reuter message to the *Financial Times*, referring to the strike on the British-owned tramways of the Lisbon Electric Tramways Co., which has now been in progress since May 29th, shows that the strike has become largely influenced by political considerations. Incitement to riot and intimidation culminated recently in an attack on the British staff, in which we gather that the manager and one employé were injured by stones thrown. The manager, it may be recalled, is Mr. A. S. Giles, formerly electrical engineer at Blackburn. The *Times*, in referring to the matter, says that, since Friday, a number of bombs have been thrown, resulting in death and injuries, and that many arrests have been made.

SPAIN.—A serious tramway accident occurred in Madrid last week, when an electric car hauling a trailer was derailed on a curve, the leading car running into a shop and the following one being overturned. About 20 people were injured seriously.

HOLLAND.—According to the *Nieuwe Rotterdamsche Courant*, application has been made to the Amsterdam municipal authorities for powers to construct a further three sections of electric tramway in that city. It is also proposed to take this opportunity of increasing the Amsterdam tramways rolling stock by the purchase of 50 new electric tramcars, 37 of which would be required for the above-mentioned extensions. The cost of these 50 cars is estimated at £41,666.

ITALY.—A concession has been granted to the Neapolitan Tramway Co., authorising the construction of an electric tramway line from the Piazza Santa Caterina to Chiaia, through the Margherita Park, and thence from the Via Tasso to Vomero.—*Board of Trade Journal.*

Croydon.—The financial result of the working of the tramways undertaking up to March 31st last, according to the tramway manager's report, was a credit balance of £32,780. The total traffic receipts amounted to £92,539, and other receipts to £1,891, while working expenses came to £61,649. The total gross balance, with bank interest and income-tax on stock, was £33,587. After deducting interest on capital (£8,046), contribution to sinking fund (£7,428), and income-tax (£808), there was a total net balance of £17,304, which is to be disposed of by contributing £8,000 in aid of the rates and £9,304 to the renewals fund. The gross balance is equal to 11·79 per cent. of the capital outlay, and the net balance to 6·07 per cent. Compared with 1910-11, the traffic receipts increased by £6,732, or 7·84 per cent.; miles run increased by 184,890, or 8·14 per cent.; passengers carried by 1,372,654, or 7·04 per cent. Working expenses had decreased by £2,141, or 3·36 per cent. The percentage of working expenses to traffic receipts was 66·62 per cent., or a decrease of 7·73. The gross balance had increased by 37·81 per cent., and the net balance by 104·56 per cent., or £8,845. The number of passengers carried in the year was 20,849,230, an increase of 1,372,654. Through-running arrangements between the Corporation and the South Metropolitan Tramways Co. over the combined lines from West Croydon to Penge and the Crystal Palace, which had been in operation during the year, had resulted in the Corporation receiving the sum of £2,903, the difference in fares collected by both parties, the company having been paid £994 for the excess mileage run. There had been a decrease in the number of through-booking tickets issued by the Corporation and the L.C.C., amounting to 356,248, but the receipts on the Norbury route had increased, compared with 1910-11 by £3,114. Since the L.C.C. tramway extension from Streatham Hill to Norbury was opened, the receipts on the Norbury route, states the tramway manager, had increased by no less than £16,438.

Finchley.—The Middlesex C.C. is to be asked to carry out the work of removing and reinstating the tramway centre poles in the Great North Road, at a cost of £3,587, made up as follows:—Alteration to street lighting, £900; alteration to ventilation shafts, £212; new pole, £10; road works, £96; alterations by the Metropolitan Tramways Co., £2,354; painting, £15. It is also agreed that the County Council be asked to continue the present arrangement with the Metropolitan Electric Tramways Co. for all-night lighting at 10s. per pole per annum.

Gateshead.—The Gateshead and District Tramway Co. formally inaugurated on the 25th inst. the service of P.A.Y.E. cars on two routes, to Bensham and Saltwell. These are the first cars of the kind to be used in Europe. The promoters of the

system claim that their cars make for the provision of a better service with greater safety, comfort, and convenience to passengers, as those leaving the cars are not brought into contact with entering travellers. The Mayor and Mayoress of Gateshead (Alderman and Mrs. W. J. Costelloe) formally inaugurated the system, the Mayor congratulating the company on its enterprise. Mr. L. C. Huppert, managing director of the International Pay-as-You-Enter Co., said the company he represented had worked the system successfully in 138 different cities, and had now in operation more than 15,000 cars, and wherever introduced they had proved a benefit to the public and an advantage to the operating company. The idea emanated from the brain of a Scotsman, and if there was prejudice in the minds of some people with regard to American methods, the company claimed that they had something which was meritorious, and Gateshead would be known as the first progressive town to inaugurate that system of tramway operation.

Glasgow.—The official balance-sheet and accounts of the year's working of the T.C. tramways department has just been issued, and the figures in the principal items of income and expenditure are exactly those which were published in last week's issue of the REVIEW, the surplus being £52,067, against £68,678 a year ago. Some interesting details are provided, it being pointed out that the gross revenue for the year showed an increase of £47,914, compared with that of the previous year, and the average traffic revenue per car-mile had been increased from 10·461d. to 10·561d. The working expenses showed an increase of £49,461, equal to ·337d. per car-mile. The increase in the revenue was due to the Exhibition traffic, the prosperous state of trade, and to the comparatively mild weather throughout the winter months. The increase in the working expenses was chiefly in wages, which alone accounted for £28,538; the third-party risk showed an increase of £9,821. It would be observed that the power expenses show a considerable increase over those of the preceding year. This increase was due to the coal strike in the Spring. The net amount of borrowing powers as at May 31st amounted to £2,495,236, but this had been exceeded by £51,686; additional borrowing powers to the extent of £191,498 were applied for in the Corporation provisional order of 1912. On capital account the amount expended up to May 31st, 1912, was £3,532,735, while the balance of tramway debt, owing to the common good, now amounted to £2,546,923. The reserve fund stood at £1,921 361, and the net capital liabilities of the undertaking amounted to £625,562. The only extension during the year was one of 154 yd., but three new sidings had been erected, and the total length of track in operation (measured as single track) was 197 miles, exclusive of depôt connections, crossings, sidings, &c. The cars in stock numbered 808, of which 673 were top-covered, while 100 of the converted horse-cars were to be replaced with new cars of the latest type, besides which 50 additional cars are to be constructed.

For years past the Corporation has been in negotiation with the burgh of Clydebank for the erection of bridges capable of carrying tramway traffic over the canal within the latter jurisdiction, and at which the Glasgow system meets that of the Dumbartonshire company—the only hiatus being that caused by the bridges. Clydebank T.C. has approved of a proposal of the Glasgow Committee that the latter Corporation should pay a sum of £11,000 towards the construction of such bridges, the Clydebank authorities to meet any expenditure in excess.

Lincoln.—The accounts of the Corporation (G.B. surface contact) Tramways for the year just closed show (for the first time since the electrification) a credit balance of £140. The working costs amounted to 6·05d. per car-mile on the small mileage of 161,897; and the revenue was 9·92d. per car-mile. The car-mileage, it may be mentioned, is the smallest of any municipal tramway in the kingdom.

London.—L.C.C.—The report of the Highways Committee on the year's working of the Council's tramway undertaking shows that the system extended over 146¼ street miles, including 13¾ miles of horse tramways. The total capital expended on the undertaking was £12,193,648 and the debt outstanding £9,658,250. The income during the year amounted to £2,356,181 and the working expenses to £1,421,968, leaving a surplus of £934,212 (the horse lines produced a deficit of £11,966). Debt charges amounted to £703,529, and with other charges made the total to be deducted £711,509, leaving a surplus of £222,703. From the latter the renewals fund benefited to the extent of £135,641 (⅜d. per c.m.) and the balance of £84,551 was transferred to the general reserve fund, and compares with £103,498 so transferred in the previous year. The renewals fund now amounts to £654,844 and the general reserve to £265,558. Due to the increased rating of the permanent way by local authorities, the operating expenses for electric traction increased from 6·48d. per c.m. in 1910-11 to 6·63d. per c.m. in 1911-12. A total of 533,440,235 passengers were carried and 50,457,812 car-miles were run.

The Committee estimates that the working of the tramways during 1912-13 will result in a gross surplus of £955,105, and after deducting debt charges will leave a net surplus of £200,105 from which it would be possible to place £143,407 to renewals and £56,698 to reserve. The Committee draws attention to the large contributions of the tramways to the rates and to street improvements, and points out the necessity of exercising the utmost caution in dealing with proposals which might adversely affect either the revenue or the expenses of the tramways undertaking. The report also discusses the question of omnibus competition at great length, pointing out the fact that omnibus companies are practically able to pick their routes and traffic, while they pay no rates for the roads used, provide no all-night service, and have no workmen's fares—the latter alone in the case of the tramways being estimated at a loss of £7,000 a year.

According to the *Daily News*, negotiations are still pending between the Omnibus Co. and the Council with a view to arranging an amicable working agreement as to fares and stages.

Morecambe.—In moving the adoption of the Tramway Committee's minutes at the meeting of the T.C., Alderman Brown stated that after making inquiries at several places, the Committee had come to the conclusion that it would be a wrong policy to issue yearly tickets. With regard to the balance-sheet of the undertaking, the total income for the year 1911-12 was £9,093, and the working expenses £5,884, leaving a gross profit of £3,208. With the addition of bank interest, there was a sum of £3,278 to be disposed of. Of this amount £1,502 was absorbed by interest and sinking fund, leaving a net profit of £1,776, of which £1,000 was devoted to the relief of the rates and the balance carried to renewals fund, which now stood at £1,116.

Mountsorrel.—The ratepayers of this parish have petitioned Leicester T.C. urging the Corporation to consider the question of a railless traction service for the district.

Newcastle-on-Tyne.—The Tramways Committee of the Corporation has decided to link up the routes between Chillingham Road and Shields Road, at an estimated cost of £6,000.

West Hartlepool.—The T.C. has decided to enter into an agreement with the Hartlepools Tramways Co. to purchase the Seaton Carew section and that part of the Hartlepool section of the system within the borough of West Hartlepool, and to obtain a lease of the lines within the borough of Hartlepool, assuming the latter Corporation does not exercise its option to lease the latter portion. It is stated that the purchase price of the Seaton Carew section, and the portion of the Hartlepool section, is between £44,000 and £45,000. When this agreement is effected the West Hartlepool Corporation will be the owners or lessees of the whole of the tramway system in the two boroughs.

TELEGRAPH and TELEPHONE NOTES.

Germany.—The Swedish long-distance microphones have proved so successful that telephonic communication between Berlin and Stockholm will shortly be opened to the public, and it is hoped that this improvement will eventually enable communication to be established between Berlin and London.

Marconi Patents in America.—The Marconi Wireless Telegraph Co. has received information from New York that the Boston Court of Appeals has delivered judgment against the National Electric Signalling Co., with costs. This judgment allows of the immediate transfer of the title of the assets of the United Wireless Telegraph Co. to the Marconi Co., and it is expected that the arrangements for the passing of title will shortly be completed.

Press Telegrams.—The Postmaster-General recently stated that the loss incurred by the Post Office on Press telegrams in each of the years 1907-8 and 1908-9 was about £205,000. Later figures are not available at present.

Radio-Telegraphic Conference.—At the first business meeting of the Conference it was announced that the British Empire, Italy and Japan had accepted the principle that all messages, and not only those relating to cases of distress, must be accepted by ships from other ships, no matter what system of wireless telegraphy was employed.

Votes have been allotted to the five principal Colonial possessions of the British Empire, in addition to the vote of the United Kingdom; the Colonies and dependencies of other countries have also been accorded votes.

According to figures put forward by the German delegation, 926 ships (apart from warships) have been equipped for wireless telegraphy, and there are 155 coast stations open for public service. The total number of ships equipped is no less than 1,577, and the total number of coast stations, 286.

Signalling to Trains.—A demonstration of the Von Kramer system of communicating with trains in motion is to take place at Stratford-on-Avon to-day.

Reply-paid Telegrams.—From July 1st the period of validity of reply-paid vouchers issued for inland telegrams is extended to 12 months.

Wireless Telegraphy.—According to the ninth supplement of the *Internationalen Verzeichnis der Funkenstationen*, on March 15th last, the following new wireless stations were in operation:—Among coast stations—the station at Colombo in Ceylon; that at Athens, and those at Aranjuez and Vigo—all on the Marconi system; besides the Ingö Rodio and Spitzbergen stations, on the Telefunken system. All these stations work with a normal wave-length of 600 metres, and are open to public traffic.—*Z. f. Schwachstromtechnik.*

The Liverpool and North Wales Steamship Co. is installing wireless plants in all its boats.

CONTRACTS OPEN and CLOSED.

OPEN.

Australia.—WESTERN AUSTRALIA.—July 31st. Postmaster-General's Dept. Telegraph and telephone material. See "Official Notices" June 21st.

NEW SOUTH WALES.—August 28th. Common battery and automatic switchboards, for Newton, Glebe and Balmain, for the Postmaster-General's department. See "Official Notices" to-day.

SOUTH AUSTRALIA.—October 1st. Telephone switchboards at Unley, Adelaide, for the Postmaster-General's department. See "Official Notices" to-day.

October 1st.—Telephone switchboards at Norwood, for the P.M.G.'s department. See "Official Notices" to-day.

October 22nd.—Telephone switchboard at Port Adelaide, for the P.M.G.'s Department. See "Official Notices" to-day.

VICTORIA.—October 22nd. Fourteen sections of common battery multiple switchboard, for the P.M.G.'s department. See "Official Notices" to-day

Barlborough (near Chesterfield).—Construction of tramway, railway siding, &c. Mr. C. Robinson, Westfield Lodge, Barlborough.

Birkenhead.—July 8th. Two 750-KW. mixed-pressure steam turbines and D.C. generators, with condensing plant, &c., and nine superheaters and interconnecting steam pipes, for the Corporation. See "Official Notices" June 21st.

Bradford.—June 29th. Tramcar equipments, trucks, timber and car fittings, for the Corporation. See "Official Notices" June 14th.

Bridgend.—July 9th. 325-KW. steam engine, alternator, and accessories, for the U.D.C. See "Official Notices" to-day.

Bury.—Motor tower wagon, for the T.C. General Manager, Tramway Offices, Market Place.

Chichester.—Cables, for the Chichester Electric Light and Power Co. See "Official Notices" to-day.

Derby.—Steam coal, for the Corporation electricity works. Borough Electrical Engineer, Full Street.

Dewsbury.—July 4th. One 1,000-KW. turbine, two 500-KW. D.C. generators, and jet condensing plant for the T.C. See "Official Notices" June 14th.

Dundalk.—July 8th. Materials and stores for the U.D.C. Electricity Department. See "Official Notices" to-day.

London.—ISLINGTON.—July 24th. One 3,000-KW. steam turbine alternator, with exciter, condensing plant, switchgear, piping, &c., for the B.C. See "Official Notices" June 14th.

STEPNEY.—July 1st. The Electricity Supply Committee is inviting tenders for meters, demand indicators, time-switches and carbons. See "Official Notices" June 14th.

L.C.C.—July 2nd. Electrical installation at the Old Kent Road special school and divisional offices. See "Official Notices" June 21st.

July 22nd.—The Howard Smith Co., 33 Cornhill, London, E.C., are inviting tenders for the following:—One 350-KW. Rateau mixed pressure turbine; one 350-KW. three-phase alternator; one surface condensing plant, together with electrically-driven pumps; two 30 ft. × 8 ft. 3 in. Lancashire boilers. Specifications and forms of tender on application.

Manchester.—June 28th. Traction feeder cables and two years' supply of transformers, D.C. and A.C. motor starting switches, time switches and clock-controlled circuit-breakers, D.C. and A.C. motors, and meters, for the Corporation. See "Official Notices" June 14th.

July 9th.—Corporation Tramways. (*a*) Tramcar trucks; and (*b*) Motors and controllers for tramcars. Mr. J. M. McElroy, general manager, 55, Piccadilly, Manchester.

Neath.—July 4th. Overhead and underground high-tension cables and transformer pillars, for the R.D.C. See "Official Notices" June 21st.

Newcastle-upon-Tyne.—June 28th. Nine-ton electrically-driven crane for the Tyne Improvement Commission. See last issue.

Rotherham.—July 8th. (*a*) Tramway stores and materials for a year for the T.C., and (*b*) Electricity meters. (*a*) Tramways manager; (*b*) Borough electrical engineer.

July 8th.—Smudge or pea nuts for a year for the Corporation electricity works; Borough Electrical Engineer.

Salford.—July 25th. Electric light, telephone and fire alarm installations at the Union Infirmary, Hope, Pendleton, for the B.G. See "Official Notices" to-day.

South Africa.—PIETERMARITZBURG.—July 29th. One steam turbine with tandem generators, switchboard and condensing plant for the Corporation.—*South African Mining Journal.*

Spain.—July 2nd. The municipal authorities of Ovildo are inviting tenders for the concession for the electric lighting of the town during a period of 10 years.

July 3rd.—The municipal authorities of Cartagena (province of Murcia) are inviting tenders for the concession for the electric lighting of the town during a period of 20 years.

Stoke-on-Trent.—Coal and slack for a year, for the four electricity works of the T.C. Chief Electrical Engineer, St. Peter's Chambers, Glebe Street, Stoke.

Weymouth.—July 1st. Small steam coal, for the Corporation electricity works. Mr. H. A. Huxtable, Town Clerk.

Worksop.—July 3rd. Battery switchboard and cast-iron exhaust pipes, for the U.D.C. See "Official Notices" June 14th.

CLOSED.

Ashford (Kent).—The South-Eastern and Chatham Railway Co. has accepted the tender of Messrs. Tyler & Freeman for the electrical equipment of the railway works at Ashford.

Belgium.—Eight concerns—one Belgian, six German and one Austrian—submitted tenders last week for the supply and laying of telephone cables in the Courtrai district, the lowest being that of the Société des Ateliers de Constructions Electriques, of Charleroi.

Brighton.—The T.C. has accepted the tender of Messrs. W. Cory & Son, Ltd., for from 20,000 to 24,000 tons of washed nuts, for Southwick power station, at 15s. 9d. per ton.

Epsom.—The U.D.C. has accepted the tender of Messrs. Pritchetts & Gold, to maintain the storage battery at the electricity works for 10 years, at £80 a year.

Erith.—For the supply of 1,200 yd. of ·075 sq. in. cable and 650 yd. of ·100 sq. in. cable, the U.D.C. received the following tenders:—

Callender's Cable and Construction Co., Ltd. (accepted)	£382	and £218
Western Electric Co.	391	,, 259
Henley's Telegraph Works Co., Ltd.	389	,, 258
Siemens Bros.	389	,, 259
Johnson & Phillips, Ltd.	387	,, 257

Glasgow.—The Tramways Committee recommends acceptance of the following tenders:—

Piping and valves for turbo-alternator for Pinkston. Babcock & Wilcox.
Controllers.—British Thomson-Houston Co., Ltd.
Block tin.—T. B. Campbell & Son, Ltd.

Government Contracts.—The following tenders have been accepted during the past month by the Government Departments named:—

ADMIRALTY, CONTRACT DEPT.

X-ray apparatus.—Henry W. Cox & Co., Ltd.

WAR OFFICE.

Electric cable.—British Insulated & Helsby Cables, Ltd., Hooper's Telegraph and India-Rubber Works, Ltd., London Electric Wire Co. and Smiths, Ltd., and Siemens Bros. & Co., Ltd.
Installation of electric light, Central Flying School, Salisbury Plain.—Foote & Milne, Ltd.

INDIA OFFICE, STORE DEPT.

Insulators.—Bullers, Ltd.
Motors.—Electric motors, Ltd., Lancashire Dynamo and Motor Co.

CROWN AGENTS FOR THE COLONIES.

"Lux" cells.—Chloride Electrical Storage Co., Ltd.
Telegraph poles.—Siemens Bros. & Co., Ltd.

GENERAL POST OFFICE.

Telephonic apparatus.—British Insulated & Helsby Cables, Ltd., C. Macintosh & Co., Ltd., Peel-Conner Telephone Works, Ltd., and Siemens Bros. & Co., Ltd.
Telephonic cables.—Callender's Cable & Construction Co., Ltd., and Johnson & Phillips, Ltd.
Dry cells.—Siemens Bros. & Co., Ltd.
Insulator spindles.—T. W. Lench, Ltd.
Two electric lifts at Eastbourne new Post Office.—R. Waygood & Co., Ltd.
Telephone exchange equipment, Pontypridd.—Peel-Conner Telephone Works, Ltd.

Hull.—The B. of G. has accepted the tender of the City Electrical Installation Co. for the supply of electric requirements for six months.

Llandaff and Dinas Powis.—The Council has accepted the tender of Messrs. Ellis & Ward for the construction of an overhead line at Whitchurch, at £229.

London.—L.C.C.—The Highways Committee received the following tenders for 7,000 gallons of machinery oil for use at the Greenwich generating station:—

	Per ton.
Vacuum Oil Co., Ltd	£8 8 0
Charles Price & Co. .. .. (recommended)	8 12 6
Stern Sonneborn Oil Co., Ltd.	9 5 0
Matthew Wells & Co.	10 0 0
Price's Patent Candle Co., Ltd.	10 5 0
W. B. Dick & Co., Ltd.	11 10 0
Spurrier, Glazebrook & Co., Ltd.	11 10 0
C. C. Wakefield & Co.	12 0 0
Snowdon, Sons & Co., Ltd.	12 10 0
John A. Bremner & Co.	13 10 0

With the exception of the contractors for last year (Matthew Wells & Co.), each of the firms forwarded samples of oil to the chemist for analysis. The Committee say that they are advised that the sample of oil supplied by the second lowest tenderer is better suited to the Council's particular purpose than that supplied by the lowest tenderer.

The Main Drainage Committee received the following tenders for three gas engines, required for completing the equipment of the Falcon Brook pumping station :—

Campbell Gas Engine Co., Ltd.	(recommended)	£5,680
Swiss Locomotive and Machine Works, Winterthur ..		6,818
Browett, Lindley & Co., Ltd.		8,524
British Westinghouse Electric and Manufacturing Co. ..		9,620
" " "	(alternative)	6,130

HAMMERSMITH.—It is proposed to alter the crane at the Chancellor's Wharf and to attach to it one of Priestman's grabs to enable the Electricity Department to deal more expeditiously with the handling of coal delivered at the wharf for use at the electricity works. The cost will be £120 10s.

POPLAR.—The B.C. has accepted the tender of Messrs. G. & J. Weir for the provision of a steam-driven boiler feed pump, with a speed of 6,200 R.P.M., at the generating station. Other tenders received were :—

A.E.G. Electrical Co.		£230
W. H. Allen, Son & Co.		247
Belliss & Morcom		250
British Electrical Plant Co.		277
"	(alternative)	326
British Westinghouse Co., Ltd.		320
British Thomson-Houston Co.		322
Jens Orten Boving		365

The following tenders were also received for vertical pumps, but these, according to the engineer, were not suitable :—

J. P. Hall & Sons.		£205
"	(alternative)	254
F. Friedenthal		240
Caird & Rayner		249
Storey & Sons		315

STEPNEY.—By the recently arranged-for conversion into alternators of two double-current turbine-driven sets, the Council is enabled to dispose of the generators attached thereto and a spare armature and coils. The offers received for the purchase of these from the Council were as under :—

	A. Brown and Sons.	J. G. Sneath.	C. Parsons and Co.
Lot 1.—Two generators of No. 2 turbine ..	£310	£290	£284
Lot 2.—Two generators of No. 1 turbine ..	310	290	284
One armature	42	40	10
Total	£662	£620	£598
One set field coils .. .. per ton	£78	£.5	£50

The Conditions of Sale anticipate that the first two machines (lot 1) will be released before the end of June, 1912, and the second two machines, spare armature and field coils (lot 2) by about the end of August, and guard the Council in case the work of converting the two double-current turbine-driven sets should not be completed by the contract time by reserving to the Council the right to cancel lot 2 if required for supply purposes during the ensuing winter.

It is proposed to accept the tender of Messrs. A. Brown & Sons.

STOKE NEWINGTON.—The B.C. has accepted the tender of Messrs. Bruce Peebles & Co., Ltd. at £1,720, for additional converting plant at the Edward's Lane transformer station, required in order to cope with increasing demands.

Norwich.—The T.C. has accepted the tender of Messrs. Whipp & Bourne for four feeder panels, at £185.

Plymouth.—The T.C. has accepted the tender of Messrs. W. G. Heath & Co. for wiring the wholesale meat market for the electric light and providing electric fans, at £68.

Royal Mail Steam Packet Co.—This company has again placed a contract with Messrs. Siemens Bros. Dynamo Works, Ltd., for the sole supply of metal-filament lamps for the ensuing 12 months. The lamps to be supplied are tantalum drawn-wire lamps, and they are to be used for all purposes, including ship and office lighting.

South Africa.—The Department of Posts and Telegraphs has accepted the tender of the British General Electric Co. for 100 Edison Lalande cells, and 250 sets of renewals for ditto, at £157.—*South African Mining Journal.*

Southend-on-Sea.—The E.L. Committee has accepted the tender of Messrs. S. Stone & Co. for band-sawing, screw-cutting, and vertical drilling machines, for the electricity works.

Taunton.—The T.C. has accepted the tender of Messrs. Newtons, Ltd., for a 15-H.P. motor for driving the induced draught fan, at £56.

Trim.—The contract for the electric lighting of the Union Buildings has been placed with Messrs. F. Carr & Co., of Belfast and Dublin. The plant includes a Hornsby oil engine, accumulators, &c. Specifications were prepared by Mr. A. E. Porte, of Dublin.

West Ham.—The T.C. has accepted the tender of Messrs. E. Newbald & Co., at £150, for the installation of electric light at the Education Offices extension. The following tenders have also been accepted for carrying out works at the generating station :—Messrs. J. Garret & Son, construction of coal wharf bunker, £3,158 ; Messrs. J. & E. Spencer, supply of hot-wells.

Yarmouth.—The T.C. has accepted the following tenders for annual supplies, except where otherwise stated :—

British Thomson-Houston Co., Ltd.—Dry batteries.
British Electric & Manufacturing Co.—Lampholders and cable.
Brush Electrical Engineering Co., Ltd.—Armature coils (three years).

FORTHCOMING EVENTS.

Physical Society.—Friday, June 28th. At 5 p.m. At the Imperial College of Science, South Kensington. Papers on "Hysteresis Loss as affected by Previous Magnetic History," by Prof. Ernest Wilson and Messrs. B. C. Clayton and A. E. Power; "The Efficiency of Generation of High-frequency Oscillations by Means of an Induction Coil and Ordinary Spark Gap," by Prof. G. W. O. Howe and Mr. J. D. Peattie; "Dielectric Hysteresis at Low Frequencies," by Prof. W. M. Thornton: and "Self-Demagnetisation of Steel," by Messrs. S. W. J. Smith and J. Guild.

Tramways and Light Railways Association.—Friday, June 28th. Annual Congress at Swansea, last day.

Faraday Society.—Tuesday, July 2nd. At 8 p.m. At the I.E.E. Annual general meeting, followed by an ordinary meeting. Papers on "Electrocapillary Pulsation of a Mercury Meniscus," by Messrs. A. P. Roshdestwensky and W. C. McC. Lewis; and "On the Variation of the Conductivity of Aluminium Anode Films with Temperature," by Mr. G. E. Bairsto.

Association of Engineers-in-Charge.—Saturday, July 26th. At 7.30 p.m. At the St. Bride's Institute, E.C. Discussion on "Condensers: Their Construction and Efficiency."

NOTES.

Fatalities.—A verdict of "Accidental death" was returned at an inquest on the body of Harry Gillis, pit labourer, who was killed on the 11th inst. by an electric coal-cutting machine at the Wharncliffe Silkstone Colliery, Barnsley. It was stated that new rules had been framed, whereby an earth wire should have been attached to the machine, but these could not be put into operation for some time, owing to its being necessary to complete other work in connection with the new rules. A Government Inspector of Electricity in Mines said that he thought the management of the colliery had had ample time to comply with the new regulations, and if they had done so the accident would not have occurred.

A terrible accident occurred at Cawthorne to a lineman named Bell, in the employ of the Yorkshire Electric Power Co. Three linemen were engaged on the work of increasing the capacity of an overhead line (10,000 volts). The foreman received word that No. 1 was dead, and instructed Bell to earth it. Bell, ignoring Rule 4 of the company's regulations—that a sling chain should be first thrown over the line before the work of earthing the cable was commenced, climbed the pole, and when standing on the outrigger slightly overbalanced, his wrist coming in contact with the line, which was alive, due to some mistake in switching. Bell was killed instantly; his wrist was burnt through, and his hand fell to the ground. His body fell soon afterwards. At the inquest a verdict of "Accidental death" was given.

A South African paper reports that a young man named Kingston was killed at the New Rietfontein Mine on June 1st. He was working underground, and while sitting on a ledge in No. 2 shaft, overbalanced and seized a live wire to prevent himself falling down the shaft. He gave one piercing scream for help, and a native rushed to his rescue. Kingston went out from England eight months ago.

At the tramway sheds at Johannesburg early this month a young electrician named W. Dunlop fell from the top of a tramcar, and sustained injuries from which he died. He had mounted the roof in order to "clear" the wires. It is thought that he must have reversed the pole, and then tripped on the canvas ridge on the roof of the car, with the result that he fell backwards on to the edge of the pit below.

Smoke Nuisance.—Last week the Bromley Electric Light and Power Co., Ltd., was summoned for black smoke nuisance in May. The secretary of the company said that they had had to use some rather dirty coal, owing to the coal strike. An order of prohibition was made, with ordinary costs.

Installation Contractors in Germany.—The varied interests of installation contractors in Germany formed the subject of discussion at the tenth annual conference of the Verband der Elektrotechnischen Installations Firmen, which was held at Frankfort-on-Main on June 17th and 18th in the presence of representatives of other German electrical and engineering associations and of delegates from friendly associations in Austria and Switzerland. During the course of a sketch of the history of the Verband since its formation in 1902, Mr. G. Montanus, the president, expressed the opinion that the introduction of the tax on illuminating appliances had caused immense injury to the installation branch, and business in glow lamps had become almost entirely unprofitable. Prof. Epstein, who presented a paper on the requirements demanded of contractors, states that the large firms still participate to a large extent in the orders and deliveries in the installation department. The supply works require special technical knowledge on the part of the installation firms, although it is possible for the latter to work without coming into conflict with the former. In any case, the supply works are able to exercise an educational influence on the contractors. The relationship between contractors and manufacturers frequently suffers from the circumstance that the latter will not agree to a better standardisation of materials. Yet it is considered that the manufacturer has a great interest in contractors becoming acquainted with his materials and machinery to a far-reaching extent. As far as education is concerned, the author remarks that both technical and commercial skill are needed for accurate and valuable work. The trade continuation schools are certainly able to provide a good finishing education, but young men cease attending at the age of 18 because they are unable to get away from

work for long, and they are too tired for mental work in the evening hours. In this respect, ways and means must be found for assuring to young installation workers a fundamental and good theoretical finishing education, as well as workshop training. The question of education was also discussed in a paper by Mr. Hohnhof, the secretary of the association, who contends that the period for the instruction of apprentices should be extended to four years, although it is admitted that no prospects exist of this being carried out at present. Special courses by experts in the installation branch are held to be desirable. Efforts have been put forth to prevent such courses being operative for too short a period, or the creation of bunglers in consequence of inadequate finishing training. Trade schools for installation work are desired in larger numbers, especially as good results have attended the new school at Cologne. Messrs. Nolzen & Baumann, who raised the subject of the regulations of electricity supply works, state that it has been found that the best way to keep unsuitable forces at a distance and to satisfy the requirements of the works is by means of a friendly understanding between the district branches of the Association and the works. A friendly reception is, however, not accorded to the branches by all supply works, particularly in the case of private works. It is held that efforts should be made to bring about a simplification of the conditions under which contractors are permitted to carry out installations for connection to distributing mains. The labour problem was also brought forward by Mr. Hohnhof, who reports that as a result of the experience gained in four towns where strikes took place last year, new and definite instructions have been arranged in the case of strikes. Negotiations in respect of workmen's wages are in future not to be undertaken through the Metal Workers' Union, but directly with the workers, and minimum rates of wages will not be agreed to. The members of the Association, on the presentation of workmen's demands, are in all cases to make a correct examination as to whether the labour and wage conditions are capable of improvement, and it is considered desirable that the negotiations should be made public for general enlightenment. The question of overland central stations, and the monopolistic endeavours of the manufacturing industry, was raised in a further paper, which, after referring to the petitions addressed to the Imperial Government on the subject, submits that the results attending the issue of Government instructions have been satisfactory on the whole. Nevertheless, great improvements are necessary in the matter of contract competitions, and it is held that the various Governments can still do good work in this direction, in so far as the communes or the State come into consideration. The final paper was presented by Mr. Kuckuk, who points out that whilst employment is declared to be good, installation firms state that they are not earning any profits. This fact has led to the wish for the establishment of standards for the improvement of prices. As a consequence, the author submits that the management of the association should endeavour to make arrangements with the large firms on a definite basis. The price-forming factors are very varied, and the district branches of the association should first prepare local lists for price arrangements, and from these a committee on prices could calculate standards for the whole area covered by the association. During the discussions, sound proposals were made with the object of securing uniform prices, and the fact that such prices already existed in some localities was adduced in order to show that an arrangement in this respect was not impossible

Institution Notes.—IRON AND STEEL INSTITUTE.—The autumn meeting is to be held at Leeds from September 30th to October 4th. A provisional programme has been issued by the secretary, Mr. G. C. Lloyd.

INSTITUTION OF CIVIL ENGINEERS.—The annual conversazione was held on Thursday last week at the Albert Hall, when Dr. Unwin, F.R.S., the President, with other members of the Council, received the guests.

Factory Steam Whistles.—Action is being taken by the U.D.C. at Acton respecting the noise occasioned by the use of steam whistles at large factories in the Vale, and the clerk has communicated thereon with Messrs. D. Napier & Son, Ltd., Messrs. Eastman & Son, and Messrs. W. and G. du Cros, Ltd. Messrs. Napier & Son replied that they had given instructions that their steam whistle was not to be blown for more than ten seconds, and they trusted that this would mitigate any annoyance. It was, however, necessary for them to use a steam whistle, and, as the Council was aware, their use was universal in all large factories. Mr. E. Monson, J.P., had informed the clerk that he, as a resident in the locality, had cause for complaint, and he requested that steps be taken by the Council for the discontinuance altogether of the use of this means of summoning workmen. The Council has referred the subject to the Works Committee with a view to considering the prohibition of the use of steam whistles throughout the district.

The Lot's Road Appeal.—The appeal of the British Westinghouse Co. in the case between themselves and the Underground Electric Railways Co., of London, respecting the turbo-plant at Lot's Road power station came before the House of Lords on June 21st. At the conclusion of Tuesday's sitting the hearing was adjourned to yesterday (Thursday).

Appointments Vacant.—The L.C.C. Education Committee has recommended the Council to appoint from September next a full-time head of the Physics and Electrical Engineering Department at the Hackney Institute, at a salary of £260, rising by annual increments of £20, to £300. Shift engineer, for the Borough Electricity Department, Rawtenstall (30s.) See our advertisement pages to-day.

Localising Ore Deposits.—The problem of finding hidden bodies of ore with the aid of electricity, which was attacked by Daft and Williams with results fully described in our pages in 1903, has again been brought under discussion by Messrs. Löwy and Leinbach, and by Mr. O. Trüstedt, who claims indeed to have suggested the use of electric waves as long ago as 1901. The method put forward by Mr. Trüstedt is based upon the fact that Hertzian waves are reflected from the surface of a conducting body. He proposes to transmit such waves in a definite direction into the ground, and to seek for their emergence with a similarly directed coherer. If the waves are thus found to be reflected, the reflecting surface will be found, of course, at the point of intersection of the directions of the transmitted and reflected waves, which are easily determined. Water-bearing strata might, and probably would, prove as good reflectors as ore bodies, and it remains to be proved whether the method is of any practical value.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—The salaries of MR. J. H. EADES, senior draughtsman in the mains department of the West Ham undertaking, and of MR. W. BRIDGER and MR. H. W. PUTTICK, assistant engineers in charge at the generating station, are to be advanced.

The Stirling T.C., on the recommendation of its Lighting Committee, has increased the salary of the burgh electrical engineer, by £35, making it £260 per annum.

The Rochdale Electricity Committee has received a recommendation from the works sub-committee, in favour of an advance of the salary of MR. ATCHISON, the electrical engineer, by £50 per annum, raising it from £400 to £450. He has been manager of the electricity works since 1900.

The Taunton T.C. has increased the salary of the electrical engineer, MR. A. J. HOWARD, from £200 to £250 as from April 1st, with a further increase to £300 a year hence, if the accounts of the undertaking for the year ending March 31st, 1913, are as favourable as those for the previous year.

Tramway Officials.—The Tramways Committee of the Exeter T.C. has recommended that the salary of the manager be increased from £160 to £200 per annum by four annual increments of £10.

At Holy Trinity Church, Bingley (Yorks.), on June 19th, the marriage took place of MR. HORACE I. PALMER, assistant manager of the Liverpool Corporation Tramways, and Miss Lydia A. Atkinson, eldest daughter of Mr. R. Atkinson, of Prospect House, Bingley.

General.—MR. H. R. MOTT, M.I.E.E., has been appointed electrical engineer and electric inspector under the City of London Electric Lighting Orders, to the Corporation of London. MR. A. ROBERTS has been appointed as meter testing and chief assistant.

MESSRS. F. C. POULTON & Co., Eccles, Manchester, are the consulting engineers to the Ambajee Taranga Railway Co., Ltd., and their Mr. Williamson is now on his way to Bombay, relative to proposed extensions of the original scheme.

MR. S. L. BENTLEY, Northern representative of the Electrical Power Storage Co., has resigned after 12 years' service. He was elected in 1900 member of the "International Society of French Electrical Engineers," after studying at the Technical Schools of Buda Pesth, Zürich and Paris. He informs us that he intends to take up inter-Continental agency work.

MR. W. H. ROWE, for many years with the Edison & Swan United Electric Light Co., Ltd., as their South London representative, and lately engineer and representative to E.M.F., Ltd., has resigned his position with the latter firm, and is, we understand, open to consider the representation of an electrical firm.

Messrs. H. C. Crews and S. Handford (Crews & Handford, consulting engineers) have dissolved partnership, the share of the latter being purchased by the former. The business will in future be carried on by MR. CREWS under his own name, at Clarence Chambers, Piccadilly, Manchester.

Obituary.—The death has occurred of MR. R. H. MEASURES, late managing director of Measures, Ltd., who was last year sentenced to a term of imprisonment. Deceased, who was 73 years of age, underwent an operation in London on Sunday, but he passed away on Monday.

The death has taken place, at the age of 85 years, of MR. W. B. BEYNON, principal of the firm of Beynon & Son, electrical engineers, of Fleet Street, Torquay. Deceased was one of the best known commercial men of the town.

Globe Electric Co., Ltd. (in liq.).—The adjourned meeting of creditors is to be held at Cannon Street Hotel on Tuesday next, July 2nd, at 12 o'clock noon.

CITY NOTES.

Aron Electricity Meter, Ltd.

THE annual meeting was held on Tuesday at Winchester House, E.C., Colonel R. E. Crompton presiding, in the absence of Mr. H. Hirst through illness.

The CHAIRMAN, in moving the adoption of the report (see ELECTRICAL REVIEW, page 1017), said the figures in the balance-sheet spoke for themselves. The net profits had risen from £27,520 to £30,542, representing an increase of over 10 per cent. The rate of dividend for both classes of shares was the same as last year. They were in the fortunate position of being able to put to the reserve against goodwill and patents the sum of £10,000 instead of £5,000, as last year, thus raising that reserve to £40,000. After this generous provision there was still sufficient left to clear off the remainder of the expenses incurred by the debenture issue of 1911. The special feature of last year's trading was the severe drop in selling prices. They had made every effort to counteract this tendency by trying to cheapen production, by economy in administration and by increasing the sales of their instruments. That they had been successful was proved by the year's results. In conclusion, he could only express the hope that they had many equally or even more satisfactory years in front of them. He would like to take the opportunity of once more thanking Prof. Aron and his loyal staff for the intelligence and determination with which they treated the many difficult problems that had to be overcome during the past year. The speaker also alluded to the splendid work done for the company by its chairman (Mr. Hirst).

MR. ROGER W. WALLACE, K.C., in seconding the motion, said he had just returned from a visit to the Continent, and he was glad to say that the prospects of the company abroad continued to be everything that could be desired, and to promise in the future still greater returns, especially in Austria, where the work was going on in a wonderfully successful manner. The name of Dr. Aron was a tower of strength to the company. The personal element in the concern contributed very largely to the enormous sale of meters throughout the Continent. Dr. Aron was not so well known in this country, but he was getting better known day by day, and he hoped that the sale of their meters here would soon equal those they had abroad.

MR. WIMP remarked that the balance of profit available for dividend on the ordinary shares amounted to 18 per cent., including the amount carried to reserve and the writing-off of the cost of the debenture issue last year. While he agreed that it was sound finance to clear the debenture issue expenses out of the way, when they remembered that the preference shareholders had always had their pound of flesh and that the arrears of commission and directors' fees had been paid, he hoped that next year the board would see their way to take into consideration the claims of the ordinary shareholders.

The CHAIRMAN, in reply, said he thought a conservative policy was the best. They wished to put the company in an unassailable condition by building up the reserve. He himself was a considerable holder of ordinary shares, and they would all like to have large dividends, but he thought it was preferable to have their property increasing in value, which would be reflected in the price of the ordinary shares in the market.

The report was adopted.

Edmundson's Electricity Corporation, Ltd.

A LARGELY attended meeting of shareholders was held on Tuesday at Salisbury House, under the chairmanship of Mr. P. D. Tuckett, for the purpose of considering a series of resolutions for the reduction of the capital of the company from £800,000 to £640,000, and also for altering the articles of association in various respects.

The CHAIRMAN said the meeting had been called to deal with a situation which had existed ever since the reconstitution of the board four years ago, and which was not dealt with then, not because they had any hope of avoiding a reduction of capital, but simply because they hoped to avoid, as in the event he was glad to say they had avoided, the excessive sacrifices on the part of both preference and ordinary shareholders which any scheme of reorganisation must necessarily have involved at that time. To-day, thanks to the marked progress which had been made in the profitable development of the business during the past four years, they were able to look forward to the future with sufficient confidence to justify an immediate resumption of dividends, and they accordingly felt that the time had now arrived for submitting a scheme for the approval of the shareholders. He would briefly explain some of the considerations which guided the board in arriving at the conclusions to which they had come. Taking, first, the capital position, there would be no question that, in spite of the improvement which had taken place, the figure at which their investments stood in the balance-sheet was still very seriously in excess not only of their present value, but also of the value which they were likely to command within any reasonable period. They estimated the permanent loss of value at £500,000. Under these circumstances, most of them would agree that it was very much better, in the interests of preference and ordinary shareholders alike, that they should put themselves in a position to resume the payment of dividends by lopping off the dead capital rather than indefinitely postpone the payment of dividends until such capital had been made good in the only way in which it could be made good, viz., out of revenue; and that being so, they would equally agree that the loss should be borne exclusively by the ordinary shareholders, this, fortunately, being rendered possible by the fact that they had reserves of approximately £340,000, which, with the £160,000, by which it was proposed to reduce the ordinary share capital, made up the figure of £500,000. Coming next to the revenue position as it affected the preference shareholders, they found themselves with the prospect of having approximately £12,000 of distributable profits available for the current year. The reason they regarded no more than £12,000 as being available for distribution was because they were determined to safeguard and secure the position of the preference shareholders, as during the past four years that of the debenture stockholders had been secured, and if they were to rely substantially on their trading profits, which to a large extent were represented by the paper of the subsidiary companies in which they held the whole or the greater portion of the ordinary share capital, they would simply be inviting a repetition of the difficulties in which the company found itself involved four years ago. This £12,000 would suffice to pay a 6 per cent. dividend on £200,000 of capital, so that the most convenient and advantageous arrangement appeared to be to split the existing £400,000 of preference share capital into two amounts of £200,000, one carrying a 6 per cent. cumulative preferential dividend, the other a 6 per cent. preferential dividend temporarily non-cumulative until they were in a position to pay the full dividend on the entire amount. This would result in the preference shareholders having half their present holding with the dividend assured, and consequently in a form in which it should immediately command a good price, whilst the other half would, he hoped, receive a steadily advancing dividend year by year. This splitting arrangement would thus afford any shareholder who, during the next few years, had occasion to realise part of his holding, the opportunity of choosing between the half with the more assured and the half with the less assured dividend prospects, and they were advised that this choice would tend slightly to enhance the market value of the dividend as compared with the existing undivided shares. They had no doubt of their ability to maintain the cumulative dividend, and as soon as the scheme had received their approval and that of the Court, they proposed to pay an interim dividend on the cumulative preference shares. With reference to the sacrifice which the preference shareholders were asked to make in temporarily abandoning their cumulative rights in respect of half the preferential dividend, he could only say that force of circumstances rendered it inevitable, since it was obviously impossible to pay away profits which unfortunately did not exist, and almost equally impossible to contemplate a scheme of reorganisation under which arrears of dividend would immediately begin to accumulate. They proposed to pay and to continue to pay the preference shareholders the whole of the available profits up to the full £24,000 a year, and they could do no more. With reference to the existing arrears of cumulative dividend, it seemed to them to be very much better to cancel these and to give the preference shareholders a permanent participation in the profits beyond the £24,000 per annum to which they were at present entitled, rather than to attempt to deal with the situation by issuing funded dividend certificates. The extra dividend arrangement afforded a far cleaner and simpler method of satisfying the claims of the preference shareholders, whilst the net result to them was for all practical purposes the same. As this cancellation of the arrears of dividend was the one feature of the scheme to which he foresaw that some of the preference shareholders were likely to take exception, he would invite their particular attention to the following considerations. In the first place, he asked them to remember that the arrears of dividend existed at all, simply because in their interests they found it desirable to postpone the readjustment of the position until now. Had it been dealt with four years ago, not only would there have been no question of any arrears of dividend, but there was every probability that they would have been called upon to sacrifice either the whole or a portion of their preferential capital rights. At that time the position of the company was as grave and critical as it well could be, so that in spite of the disappointment of the last few years, a disappointment shared to the full by the ordinary shareholders who had lost both capital and dividends, he thought they might well derive some consolation from the fact that they were now able to present a scheme which left them with all their original rights ultimately intact, and with the prospect of having an additional 1 per cent. added to their dividend. In the next place, he would warn them not to be misled into supposing that the figure of £132,000 represented 132,000 sovereigns. If it represented 132,000 shillings, that was probably as high a value as could fairly be put upon it at the present time, having regard to the fact that it was only payable out of future profits after making good lost capital, after paying the current preferential dividend in full, and after satisfying the arrears of dividend which would have accumulated between now and then, were the dividends, which they now proposed to resume, to be indefinitely withheld. Moreover, any value which attached to the arrears, equally attached to the extra dividend, and would be reflected in the price of the shares, since in both cases it was equally dependent on the same future profits. He knew it was in human nature to prefer to handle a piece of printed paper with so many pounds, shillings and pence inscribed on it, but if the actual value of that paper was no more than the value which was represented by the extra dividend, then the preference lacked any valid basis, so that if they were right in believing that the permanent addition to the preference dividend of an extra 4 per cent. for every 1 per cent. paid on the ordinary up to a maximum of 7 per cent. more than represented the value of the arrears, then it was a fair equivalent for the immediate sacrifices they were asked to make. However sacred they might consider the rights of preference shareholders, practical considerations compelled them to recognise that where a company was in the unfortunate position in which they found themselves, some sacrifice on the part

of the preference shareholders was inevitable if the position was to be adjusted for their benefit equally with that of the ordinary shareholders, and during the next few years primarily for their benefit. No one questioned the right of the preference shareholders to be paid their arrears of cumulative dividend before the ordinary shareholders were entitled to participate in the distribution of profits, but under the circumstances with which they were confronted, he more than questioned the wisdom of their adhering to their strict legal rights. Were they to do so, instead of enjoying the prospect of an immediate resumption of dividends, they would be depriving themselves of any hope of a dividend for many years to come. Not only so, but probably for some years they should see the price of their shares standing lower than it did to-day, instead of at the premium at which he fully expected to see them stand some five or six years hence. He knew it was impracticable to expect everyone to see eye to eye on questions of this kind where an infinite variety of possibilities of adjustment presented themselves, but although they might not have succeeded in reconciling every point of view, he was glad to say they had received a very large measure of support from preference and ordinary shareholders alike, and he, therefore, sincerely hoped that in their interests, as well as in those of the company, they would see their way to adopt the scheme with comparative unanimity.

MR. GRIPPER seconded the resolutions for the reduction of the capital, and they were put to the meeting, and carried unanimously, amidst loud applause.

The CHAIRMAN then dealt with the resolutions for the alteration of the articles of association, and said he had received suggestions of disapproval of the proposal to empower the directors to issue shares at a commission of 25 per cent. The provision was put in by their legal advisers, and the board were quite satisfied to substitute 10 per cent. Then there was an objection to the addition of words to Article 94, which would exclude the provision as to the directors being prohibited from voting in regard to any contract by which the directors made advances to the company, or subscribed for or underwrote shares. If the shareholders did not want the addition, the board did not mind, but if they did not have it, it would preclude the directors from advancing money at any time it might be needed. Then there was the article fixing the remuneration of the directors at £1,200 a year, with the further proviso that after 5 per cent. was paid on the ordinary shares, the directors should receive 10 per cent. of the surplus profits. Seeing that they had to control a capital of something like £3,000,000, and that they practically administered 30 companies, he thought they were entitled to receive a larger remuneration then at present.

MR. SWINTON seconded the motion.

MR. HITCHIN doubted if the directors would be wise to tie their hands by substituting 10 per cent. for the 25 per cent. in the resolution.

MR. BINGHAM and MR. HEDGES spoke at some length, and suggested that the chairman should receive higher remuneration than the other directors.

The CHAIRMAN said the other directors had intimated that he would receive £500 a year.

The resolutions were then carried.

A SHAREHOLDER asked if the chairman could give any idea when the ordinary shareholders would get a dividend.

The CHAIRMAN said he could guess, but it would only be a guess.

The SHAREHOLDER: Give your guess.

The CHAIRMAN said he thought he had better not commit himself. He would be surprised if they did not see a steady improvement in the position. It would not seem very rapid at first, because until the Urban Electricity Corporation were in a position to resume the payment of a dividend on their ordinary shares, the profit would not come through to them.

At a subsequent meeting of the preference shareholders, the resolutions were carried unanimously.

Continental.—BELGIUM.—The report of the Antwerp Telephone and Electrical Works, of Antwerp, for the last financial year, shows a loss of £7,081.

GERMANY.—Elektrolicht, Spezialfabrik für Moderne Illuminations und Reklame Beleuchtung G.m b.H., Berlin, is the style of a company formed to take over all the patent rights of the Engineer Otto Weber, dealing with glow-lamp and other illumination arrangements for advertising purposes; also the manufacture of the same. The granting of patent licences can only be effected with the agreement of the societies. The capital is 55,000 marks; Eng. Otto Weber is the managing director.

Cleveland and Durham County Electric Power Co., Ltd.—The report states (says the *Financier*) that after deducting debenture interest, the accounts for 1911 show a profit, including £194 brought forward, of £13,776, from which the directors have declared a dividend of 2¾ per cent., as compared with 2¾ per cent. for 1910, leaving £528 to be carried forward.

Direct United States Cable Co., Ltd.—The board announce an interim dividend of 2s. per share, less income-tax, being at the rate of 4 per cent. per annum for the quarter ending June 30th, 1912, payable on and after July 31st.

Japan.—The Yokohama Electric Co., Ltd., is declaring a dividend of 11 per cent. for the last financial year.

Winnipeg Electric Railway Co.—A quarterly dividend at the rate of 12 per cent. per annum is announced. This does not relate to the shares recently issued.

Electric and General Investment Co., Ltd.

THE meeting of this company was held on Tuesday at Winchester House, E.C., Mr. J. B. Braithwaite in the chair.

In moving the adoption of the report (see ELECTRICAL REVIEW, page 1017), the CHAIRMAN said that they were able to show a profit of £17,977, as compared with £11,840 last year, an improvement of a little more than £6,000. The changes in the balance-sheet were largely due to the scheme of reorganisation which they adopted last year, and which did away with the two reserve funds which previously appeared in a separate account belonging to the ordinary and the founders' shares respectively. The investments in debentures and shares of other companies now stood at £268,390, as compared with £250,154, an increase of £18,000. Sundry debtors stood at £42,762, against £9,208. On the other hand, sundry creditors had risen from £28,000 to £42,600, due to the syndicates in which they were interested and which they managed. The balance carried to profit and loss amounted to £5,726, against £1,200 last year. They were proposing to adopt a conservative policy, and of the additional profit they were placing £2,762 to a carry forward, which they were able to do this year for the first time, owing to the alterations which the shareholders consented to at the last meeting. They were adding £2,978 to the provision for contingencies, raising it to an even figure of £82,000, so that they were putting away into the carry forward and into the contingencies fund rather more than the whole of the extra profit made, which, he thought, they would agree was a sound and conservative policy. That left them with an amount for dividend of £3,000, which enabled them to pay the full 10 per cent. on the £1 that was paid up on the 20,000 ordinary shares and 6d. per share on the newly created 40,000 deferred shares of 1s. each. With regard to the depreciation, he was glad to say that the satisfactory progress which had been noticeable during the last two years had continued at an accelerated ratio. The year before last he told them that the figures had improved to £7,000; last year they had improved a further £13,000, making £20,000 in two years. This past year they had shown an improvement of £22,000 more, so that now on the whole £268,000 there was only a depreciation of £12,000, and another year's progress on the same lines should put them on the right side. He was pleased to say that the present year had opened in a promising manner. They had got some very good business on hand at the present time and also some profits over from last year, which he hoped would be substantial.

MR. E. GARCKE seconded the motion.

Replying to a shareholder, the CHAIRMAN said that if they continued to go on as they were now, their policy would be to build the company upon a sound financial basis, and probably increase the carry-forward, and no doubt when the depreciation was wiped out and they got a credit balance, they might possibly establish a special fund for the depreciation on investments. The board were sparing no efforts to bring the company into the position of a very sound concern, and he had every hope that within a very few years it would be in a fine financial position.

The report was adopted.

Stock Exchange Notices.—The Committee has appointed special settling days as under:—

Friday, June 28th.—Consolidated Gas, Electric Light and Power Co. of Baltimore.—$700,000 additional common stock, in shares of $100 each.

Wednesday, July 3rd.—Constantinople Telephone Co.—Provisional certificates for 50,000 ordinary shares of £T5 50 each fully and partly (£2) paid, Nos. 1 to 50,000.

County of London Electric Supply Co., Ltd.—Further issue of 19,000 ordinary shares of £10 each, fully and partly paid, Nos. 80,001 to 99,000 (provisional certificates).

River Plate Electricity Co., Ltd.—Further issue of 30,000 ordinary shares of £1 each (issued at £1 per share premium), fully and partly (5s. capital) paid, Nos. 119,994 to 120,500 and 120,508 to 150,000.

Companies Struck off the Register.—The following companies have been struck off the Register, and are accordingly dissolved:—

Electric Timber-Seasoning and Preservation Co., Ltd.
Improved Electric Glow Lamp Co., Ltd. (Registered July 2nd, 1900).
Johnstone, Benjamin & Co., Ltd.
London and Provincial Electric Construction Co., Ltd.
McPhail & Simpson's Dry Steam Patents Co., Ltd.
Scott-Snell Self-Intensifying Gas Lamp Co., Ltd.

R. Waygood & Co., Ltd.—Mr. D. W. R. Green presided at the annual meeting held at Cannon Street Hotel, E.C., on 24th inst. He said that their turnover for lifts was 15 per cent. above the preceding year, which was itself a record year. Alterations had been made at their factories, and a new building had just been completed which would afford additional facilities for their electrical work. The financial result of the year's operations was briefly mentioned on page 1017 of our last issue. The chairman referred to some of the important contracts executed during the year, including the provision of 14 electric passenger lifts for the Royal Liver building, and 16 lifts for the *Olympic* and the ill-fated *Titanic*. Mr. H. Harmsworth seconded the adoption of the report, and it was carried unanimously.

Rio de Janeiro Tramway, Light and Power Co., Ltd.—The directors have declared a dividend of 1¼ per cent. on the issued capital stock.

Hobart Electric Tramways Co., Ltd.—A further dividend of 1s. per share, free of income-tax, is announced.

Held Over.—Owing to heavy pressure upon our space, reports of meetings of several telegraph and other companies are held over until next week.

General Electric Co., Ltd.

The directors' report, which is to be submitted at the meeting to be held at Cannon Street Hotel, E.C., on Monday, July 8th, states that the net trading profits and income from investments, &c., to March 31st, 1912, amount to £133,564 plus £12,214 brought forward, making a total available profit of £145,777. After deducting debenture interest and depreciation amounting to £32,400, there remains a balance of £113,377, out of which the dividend on the preference shares at the rate of 5 per cent. for the year ended March 31st, 1912, has been paid, absorbing £12,500, leaving an available balance of £100,877, which the directors recommend should be appropriated as follows:—Provision for managing director's and employés' bonus, £8,866; provision for dividend on ordinary shares at the rate of 7½ per cent, for the year ended March 31st, 1912, £29,960; to reserve account, £30,000; balance to be carried forward, £32,050. The reserve account balance at March 31st, 1911, was £110,000, and with the above appropriation of £30,000, there is a total reserve account of £140,000.

"The directors are satisfied with the result of the year's trading. All the company's works have been fully employed throughout the year. The extensions to works as well as in the trading organisation of the company, required in consequence of increased business, have been carried out successfully. The increase in the investment account is due principally to the incorporation and establishment of subsidiary trading companies abroad."

Mr. M. Railing offers himself for re-election as a director, and the auditors offer themselves for re-appointment.

We give below the comparable figures from the reports for the three years ended March, 1910, 1911 and 1912:—

	1910.	1911.	1912.
Net trading profit and income from investments ...	£95,462	£119,146	£133,564
Depreciation and debenture interest	27,057	32,331	32,400
Balance	68,404	95,734	113,377
Pref. dividend 5 per cent. for the year	12,500	12,500	12,500
Available balance	55,904	83,233	100,877
Managing director's and employés' bonus	5,590	7,431	8,866
Ordinary dividend	19,395 (5 %)	19,973 (5 %)	29,960 (7½ %)
To reserve account	22,000	43,615	30,000
Balance carried forward ...	8,919	12,214	32,050
Reserve fund total	158,488	202,104*	140,000

* As £92,104 of this was applied towards writing down goodwill and patents, the total reserve was £110,000.

Goodwill and patents stand at £1 in the balance-sheet.

The company's investments consist of debentures, stocks and shares to the amount of £239,943, and the income upon these was £21,224 for the year. Sundry creditors stand at £335,819; sundry debtors at £411,857; stock in trade at £404,458; and bank balances and cash in hand amount to £50,974. The capital issued is £250,000 preference, £399,470 ordinary, and £200,000 in 4 per cent. first mortgage debenture stock = £849,470.

The directors and officers of the General Electric Co. are to be heartily congratulated upon the excellent position of affairs reflected in the above comparison. Bearing in mind the company's aggressive developments in different Colonial and foreign parts of the world by means of subsidiary companies, which should soon be bringing in a good share of business, if, indeed, they are not already doing so, the outlook of the company seems to promise a period of continued, if not still greater, prosperity.

From an article in the *Financial News*, we gather that at a special meeting held last Friday, the board resolved, subject to confirmation, to raise the rate of dividend on the preference shares from 5 to 6 per cent.

India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.

Major Leonard Darwin, who presided on Tuesday at the meeting of this company, held at the offices, said that at these half-yearly meetings there were no accounts to present to the shareholders, and that the object of bringing them together was to enable the directors to give the shareholders, so far as could be done, some idea of how the business was progressing. This information could only be of a general character in view of the fact that no complete statement of accounts had been drawn up. The board very much regretted that they could only see their way to make a distribution of dividend to the preference shareholders. The ordinary shareholders might feel aggrieved that, while they received no dividend, the preference shareholders were more favourably treated. But the payment of the preference dividend should in itself re-assure them to a certain extent that things were not quite so unsatisfactory as they might otherwise be led to assume. What, however, was of more importance to them was to feel that the phase of passing the interim dividend on the ordinary shares was brought about by causes which were abnormal, and which, in due time, would not disturb their trading to the same extent as had unfortunately been the case recently. In the first place, he was sorry to say they had not had a time of peace in which to recover from last year's disaster. The unrest in the labour market was notorious to all. The coal strike brought about an increase in the cost of fuel, disorganised a good many of the railways, and consequently interfered with the transport of raw material and the distribution of manufactured goods. The recent trouble in the docks, although never very serious, had brought about a certain amount of disorganisation in traffic. The coal strike was, however, a serious matter, as the increase in the price of coal at given periods during the strike was very great, and a permanent increase had been left in its trail. The selling of rubber goods had not been an easy matter during the past six months, that was to say the obtaining of profitable prices for their productions. As a matter of fact, the price of raw material had not varied very greatly since a year ago, but the ever-increasing surplus of plantation rubber had probably instilled a belief into manufacturers that prices lower than those which actually were ruling would eventually result, and with this view they had been underselling so as to clear their stocks preparatory to replacing them at lower figures. In other words, whilst the prices paid for the raw material should not result in a low profit, yet the selling market of manufactured goods might do so for the reason above stated; for one heard complaints on every side among rubber manufacturers at the prices obtainable for their finished stuff. Again, it was perhaps worth mentioning that the National Insurance Act would throw a further burden on their shoulders, not only on account of the contribution which their company would have to make, but on account of the extra clerical expenses they would be put to in order to carry out its provisions. He was glad to say they had secured an order for the manufacture and laying of a submarine telegraph cable, and their cable steamer *Silvertown* would shortly sail to lay it down between Australia and New Zealand. Under all the circumstances the board had thought it best in the interest of the business not to recommend the payment of a dividend on the ordinary shares. He moved "that a distribution of 5s. per share, less income-tax, to the holders of preference shares be approved and sanctioned."

Mr. Robert Kaye Gray seconded the motion.

Mr. Henderson said that he had visited the works, and was shocked at the disorganisation. It was true he was told that the works were being reorganised, and he would like to know what progress had been made.

A Shareholder asked the chairman if he could give them any hope of a dividend for the year.

The Chairman said there was, of course, great difficulty in speaking with confidence of the future. It must be more or less of a speculative estimate of what the future was going to be. The real difficulty of arriving at an estimate was the fact of the large amount of seasonal trade they did. In other words, the amount of their sales was very much greater in the second half of the year than the first, whilst the expenses ran evenly throughout the whole year. It would be quite possible to make no profit during the first half of the year and yet make a very considerable profit in the second half. Under these circumstances they felt it necessary not only to be cautious in their remarks, but to be conservative with regard to dividends. The dividend at the end of the year would depend on the total profit, and at the end of the year they would see how things went. At the last meeting he told them that they had considerable confidence in the future, but they regretted the record of the past. He had nothing to retract from that. He stated last year that their disaster was mainly due to the high price of rubber, and as they knew rubber had been fairly steady since then. There had also been no special circumstances like last year, although the coal strike caused them some loss. Last December he mentioned that certain other companies had been unfavourably affected by the same circumstances that had affected their company, and he had a list in his hand bearing that out. The chairman proceeded to give the losses sustained by different rubber companies, and said it indicated that there had been widespread trouble amongst the rubber manufacturing trade. When a disaster occurred to a company like theirs, it was natural that everyone concerned searched the whole machine for weak spots. That had been so with them, and things had been put right. He thought, however, that Mr. Henderson's phrase as to the works being disorganised was too strong. The difficulty of carrying on work on an old crowded site was great, but he believed there had never been anything approaching disorganisation. He did not believe it was safe to give a definite prophecy, but he did say that they were rapidly getting into their normal stride. He did not know how near to the old level they would get by the end of the year, but he was as hopeful of that company as of any manufacturing company. He asked them to be patient for one more half-year, and then he trusted they would meet under happier circumstances.

A vote of thanks was proposed to the board and the staff, and Mr. Henderson, in seconding the motion, said that perhaps his remark was too strong. He was perfectly satisfied that the board and staff were capable of carrying out their duties.

The motion was carried.

Greenwood & Batley, Ltd.—The directors' report (according to the *Times*) shows that after providing for interest on the debentures, expenses of management, and doubtful debts, there is a profit for the year ended March 31st of £25,295, making, with the balance brought forward, £27,677. The directors have allocated to depreciation £8,000; provision for contingent loss on certain contracts, £2,500; written off book value of an investment, £1,000; provision for additional plant, £4,000; and provision for estimated charges to March 31st, 1913, under the National Insurance Act, £1,500. The dividend on the paid-up cumulative preference shares for the year at the rate of 7 per cent. per annum is to be paid, leaving £3,649 to be carried forward. The profits for the preceding year were £20,198.

Nairobi Electric Power and Lighting Co., Ltd.

THE directors report that during 1911 the company shared in the general progress and prosperity of Nairobi, as may be seen by the following comparative figures :—

	1910.	1911.
Units generated	416,621	581,418
Motors connected, B.H.P.	147	173
Lights connected, 8-C.P. equivalents	5,732	8,193
Street lighting	2,000	2,000
Net profit	£403	£2,027

The latest advices from Nairobi indicate greatly improved results for the present year, and the revenue for the first quarter of 1912 is equal to that of the first two quarters of 1911. In consequence of the growing demand for current, it has now become necessary to arrange for the installation of further power plant to supply same, and additional power stations on the Ruera river will be established. Mr. Chas. Udall, the chief engineer, who has been at Nairobi for the past four years, is coming to England on a holiday and to confer as to the new installations.

British Electric Traction Co., Ltd.

MR. E. GARCKE, chairman, presided on Thursday, June 20th, at the Holborn Restaurant, over the 16th ordinary general meeting of the above company.

In moving the adoption of the report (see ELECTRICAL REVIEW, page 1015), the CHAIRMAN referred to the re-arrangement of the capital of the company, and congratulated the shareholders on the unanimity of the decision and upon the result. The directors were particularly indebted to the shareholders' committee for the reasonable spirit in which they co-operated with the board to bring about a solution. The result of the various meetings had been to produce a better understanding and an appreciation by the shareholders of the difficulties under which the company had laboured. The chairman referred to the retirement of Sir Rivers Wilson and Sir Charles Freemantle from the board, and to the election of Mr. Symons and Mr. Tegetmeier to the board. He said that altogether the board, as now constituted, was both varied in experience and composite in opinion. They had as much optimism as was good for them and as much pessimism as they could do with. There was plenty of initiative, and no lack of criticism, and there was no waste of time due to misunderstandings or want of knowledge of the language of business. The report and accounts were as full of information and as accurate in preparation as any report and accounts he had seen, and they could not fail to produce on the minds of anyone who carefully perused them an impression of the magnitude of the business they were carrying on, and a belief in the inherent soundness of the enterprise. The only regrettable conclusion to be drawn from the document was that the business was not as profitable as it deserved to be, having regard to the important services they rendered to the public. But inadequate though the profits were, they were doing as well as could be expected. He had before him the published figures of the profit made by all the electricity supply undertakings of the United Kingdom. The average profit was 4·3 per cent., whilst the profit made by their electricity supply undertakings was 4·4 per cent. The average profit made by all the electric traction undertakings in the United Kingdom was 3·8 per cent., whilst the net profit on their tramways was 3·54 per cent. In the case of the tramways, their average was slightly below the general average, but this was due to the fact that their tramways were situated for the most part in rural and interurban districts, whilst the tramways of the large cities, where more profit was made, were in the hands of the local authorities. Their receipts per route-mile were lower than the general average, but their expenses of working were also lower, which pointed to the efficiency and economy with which their undertakings were worked. He could not, of course, deal with all the matters, but he would touch on the salient facts in the accounts and hoped to be able to show that practically in every department there was some improvement. The number of passengers carried, and the receipts per route-mile, showed a good increase. The electricity generated showed an increase of over 5 million units, representing an increase of about 10 per cent. The net profit earned by all the affiliated companies was £708,000, an increase of £86,000, and the amount placed to reserve and carried forward by all the companies was £247,000, or an increase over the preceding year of £25,600. The net profit made by the British Electric Traction Co. was £176,000, an increase of £26,000, and the amount placed to reserve or written off by the B.E.T. Co. was £59,000, or an increase of £23,600, so that altogether no less than £308,000 had been reserved by the B.E.T. Co. and the associated companies out of the last year's accrued profits of £708,000. In the memorandum which was issued to the shareholders last year in connection with the rearrangement of capital, he said : "According to the present practice the associated companies set aside varying amounts for depreciation of capital after charging the costs of repairs and maintenance. Besides these reserves, the British Electric Traction Co. is setting aside annually out of its profits an amount to meet depreciation in the value of the shares and debentures which it holds in these same companies, and in 1910 the directors decided so long as such depreciation continues, to transfer to reserve any profits or losses, other than accrued dividends or interest, made by realisation of the then existing investments. I am expressing no opinion as to whether the reserves are adequate or otherwise, but I wish to point out that the question of what reserves should be made deserves further consideration." The federated companies were now engaged in an exhaustive examination of the whole question of reserves, and they hoped before the next accounts were made up to arrive at a satisfactory conclusion on the subject, so that each company would hereafter allocate its profits between reserve and dividends in such a way that the shareholders might feel full confidence that adequate provision had been made for the replacement of circulating and reservable capital, and also that dividends were not withheld because of some unnecessary and indefinite apprehension that depreciation of fixed or permanent capital was in every case to be provided for. On this occasion, however, they could not do otherwise than apply all the surplus profits after paying the 6 per cent. on the cumulative preference stock, to the placing of their house in order. They might have paid a small dividend on the 7 per cent. preference stock, but by not doing so they were able to present a much nicer balance-sheet, and the directors felt that the right thing on this occasion in the best interests of the company was that in the first balance-sheet produced, after the re-arrangement of capital, all items not strictly represented by tangible assets, should be eliminated so far as necessary ; so that the whole of the reserve could be made applicable towards meeting the deficiencies on investments and undertakings. The reserve now appeared in the balance-sheet as a deduction from the cost price of the investments and undertakings, and they would continue to increase the reserve by any profits they made by the realisation of the investments, and also by an annual contribution out of the profits, and *pro rata*, of course, they would reduce the reserve by any losses they might from time to time make on the realisation of investments and undertakings. This was a wise and perfectly intelligible policy which would enable the shareholders to follow the progress of the business from year to year without any difficulty. Shareholders, however, must not be alarmed if from time to time they made large inroads on the reserve. Whenever a depreciated investment could be sold to advantage they would not hesitate to realise, although by so doing they might show a loss on capital account, which would be met by the reserve. They were continuing the policy previously announced of gradually selling their consols and investing the proceeds in other good securities with a better yield. One good feature presented by the item of investments this year was that the proportion of investments which was unproductive had been reduced by £160,000, and the market value of these investments which were quoted was £48,000 higher. But the most satisfactory feature was the increase in the average yield. This year it was 3·77 per cent. on the total cost after deducting the reserves, which compared with 3·1 per cent. for 1910, and 3 per cent. for 1909. This increased profit had been for the most part utilised in strengthening the position of the company, and to a small extent in paying dividends. The position of the company had been strengthened in various important ways which could not be represented in the accounts, but to some of which he would refer. In view of the policy he had explained of carrying the profit and loss on the realisation of investments direct to the reserve, the figure showing the yield each year on the net amount of investments would be the key to the position of the company. With 57 companies in their list, it was impossible for him to refer to everyone, but some of the developments were so important that he must call attention to these. The Metropolitan Electric Tramways Co., which paid 6 per cent. on its ordinary shares, had arranged for through running with the L.C.C., and another development of importance was that they had decided to run motor-omnibuses through London in connection with the tramways. They had also an associated company, the British Automobile Traction Co., which was arranging to work several motor-omnibus routes in London and in the provinces, but they had no intention of encouraging unremunerative competition. The North Metropolitan Electric Power Supply Co. was increasing its business most satisfactorily, and for the past year paid a dividend of 9 per cent. on its ordinary shares. The Bombay Co. had now entered on the dividend list, and paid 3 per cent. on the ordinary capital, and he thought he was justified in saying this was but an indication of better results which would be obtained in the future. The Auckland Electric Tramways Co., in which they had a large holding, was also developing very satisfactorily, and whilst paying 7 per cent. on the ordinary shares, was building up a strong reserve fund. In the case of the Potteries Co., the net balance was £35,500, compared with £27,300 in the preceding year. The Barrow Co.'s surplus was £7,700, compared with £6,100 ; Birkdale paid a dividend of 7 per cent., compared with 5 per cent. ; the Yorkshire Co. had a surplus of £9,500, compared with £8,100 ; the Devonport Co. had a revenue of £26,700, compared with £22,900 ; Weston had a balance of £5,000, compared with £3,600 ; the Greenock Co. paid 5 per cent., instead of 3 per cent. on the ordinary shares ; the Swansea Co.'s revenue was £62,400, an increase of £3,151, and this company had also made a satisfactory arrangement with the Corporation for the co-ordination of the tenures, which had an important bearing on the capital value of the undertaking, although it was not expressed in the revenue account. Without going further into details, he might say there had been an all-round improvement not only in net profits but also on capital account, which would find expression later on when they realised the investments. Of course, there were inevitably some bad features, and some of the undertakings while paying their debenture interest and the dividends on the preference shares, were not earning sufficient profits to pay anything on the ordinary shares, whilst a few companies were actually losing money ; but even in those cases they had the consolation of knowing that the losses were less than in the preceding year. There were six or seven companies which showed debit balances on their revenue account, and the total losses on these companies last year was between £8,000 and £9,000. Regrettable as the losses were, they were small in relation to the profit of £708,000 made by the other companies in the federation. In the case of the Brush Co., the loss was less than in the preceding year, and they were anxiously considering how the situation could be further im-

proved; but with the frequent strikes in other industries, which had a bad effect on their business, and with the intense home and foreign competition, the electrical manufacturing companies of this country had a very uphill struggle. They were mainly looking abroad for their new enterprises, and during the past year they acquired, jointly with some financial friends, an important interest in the British Canadian Power Co., which supplied power to the large silver-producing district near Cobalt in Canada. They were at present engaged in developing the business, and probably next year would make an issue of capital. The figures in the balance-sheet explained themselves. An important feature in the present position arose out of the liquidation of the City of Birmingham Tramways Co. They made an investment in the shares of the company some years ago with the intention of dealing with the tramways there, but they had been prevented from doing so. Still they had made a satisfactory investment. They paid £1 17s. 6d. for each share, and were now receiving a return of the capital equal to £4 per share, representing a profit on capital account of £113,900. They had also received dividends of 10 per cent. last year, and for the past 18 months had had 19 per cent. The City of Birmingham Tramways Co. had been accumulating large resources, amounting to between £600,000 and £700,000, and had established a profitable investment business. It had, therefore, been decided to form a new company—the Electrical and Industrial Investment Co.—and take over the investments of the tramway company, and their federated company, which held the shares, would, therefore, receive shares in the new company of a higher value than the shares which it held in the City of Birmingham Tramways Co., but the appreciation in the value of these shares would be treated as a profit on capital account, and not as profit on revenue account available for dividend. The formation of the Investment Co. would give them the opportunities of utilising their surplus capital to greater advantage than had been possible hitherto. They had been looking out for new directions in which to employ their energies and invest their spare capital, and they hoped, by doing general financial business, they would be able to increase their profits. They would continue to give preferential consideration to suitable and profitable electrical enterprises, because that was the department of industry of which they had special knowledge and experience, but he feared that the scope for investment of capital in electrical enterprises in this country would be restricted so long as the Legislature treated the electrical industry as the Cinderella of commerce, with labour troubles and municipal veto as the ugly sisters. Proceeding to touch on the question of fares, the chairman observed that it was impossible to obtain any marked improvement in the situation in regard to them without the sympathy and support of public opinion, and he asked all of them to assist in that direction. The chairman next dealt with the continued unrest in the labour world and the prejudicial effect it had on all industries, and expressed the hope that a statesman would be forthcoming who was able to equitably adjust the altered relations between capital and labour. Their superannuation fund for the benefit of the officers had been converted into an endowment fund, but the cost to the company would be the same as before. With regard to the Friendly Society, which included 3,000 men, they had, in view of the Insurance Act, decided to register as an approved society, and to extend its operations to the clerks and others who came within the scope of the Act. How the arrangement would work remained to be seen. In conclusion, the chairman said he was glad to be able to assure the shareholders that he now felt more hopeful as to the future of the company than he had done at any time since they were overtaken by adversity, and he was confident, not without reason, that if they continued along the course on which they were now proceeding, and the political, social and economic conditions of the country did not get worse, the time was not very distant when they would recover some measure of their former prosperity.

MR. J. S. RAWORTH seconded the motion, and the report was adopted without discussion.

Brazilian Amalgamation.—It is announced that a company has been incorporated under the laws of Canada, entitled the Brazilian Traction, Light and Power Co., Ltd., with a capital of $120,000,000, divided into 1,200,000 shares of $100 each. The principal object of the new company is to bring about a consolidation of the Rio de Janeiro Tramway, Light and Power Co., Ltd., the Sao Paulo Tramway, Light and Power Co., Ltd., and the Sao Paulo Electric Co., Ltd., by issuing its share capital in exchange for the issued share capital of the three companies. The principal shareholders, representing a large percentage of the capital of each company, have expressed their approval of the exchange, and a circular will shortly be issued to the general body of shareholders, inviting them to make the exchange on the terms mentioned above. Sir William Mackenzie will be chairman, and Dr. F. S. Pearson president of the new company, and Mr. E. R. Wood, Mr. Z. A. Lash, Sir William C. Van Horne, Sir H. M. Pellatt, Mr. Alexander Mackenzie, and Mr. R. M. Horne Payne are to be on the board.

Trafford Power and Light Supply (1902), Ltd.—The report states that the accounts for the year to March 31st show a net profit, after charging interest on debenture and loans, &c., and £3,000 for depreciation, of £512, a debt balance of £2,823 brought forward being reduced to £2,311.—*Financier.*

Eastern Extension, Australasia and China Telegraph Co., Ltd.—The directors have declared an interim dividend, for the quarter ended March 31st, of 2s. 6d. per share, free of income-tax.

Prospectuses.—*The Canadian-British Engineering Co., Ltd.*—In our advertisement pages this week will be found the prospectus of this company with whose objects our readers are already familiar by reason of the article on "Trade with Canada," which appeared on page 701 of the ELECTRICAL REVIEW for May 4th, 1912, and wherein the scheme of Mr. Leonard Andrews for extending British engineering trade in the Canadian market was outlined. After what we have already said it is not necessary for us to do more than indicate one or two supplementary points which the prospectus makes public. The share capital is £205,000 divided into 200,000 non-cumulative 7 per cent. preferred ordinary shares of £1 each and 100,000 deferred ordinary of 1s. each. The former will also be entitled to 50 per cent. of the surplus profits available for dividend after they have had their 7 per cent. The deferred will take the remaining 50 per cent. The present issue is of 100,000 of the preferred, and the subscriber is entitled also to subscribe for one deferred share for every five preferred allotted to him. The directors of the company are: C. Leonard Agnew (Illingworth & Agnew, brokers to the company), W. H. Patchell, Leonard Andrews (of the Key Engineering Co., Ltd., who is to be managing director in Great Britain), and W. A. Martin, of Toronto (late assistant general manager of the Toronto Electric Light Co., who is to be managing director in Canada). There will be a local board in Canada as follows: W. A. Martin, E. M. Sellon, C. Ruttan and N. Thompson. The offices of the company are at 4, Queen Victoria Street (secretary *pro tem.*, R. G. Sidford). The company will carry on the business of an engineering supplies and construction company in Canada on the lines already explained, the plant required being purchased, as far as possible, from leading firms in the United Kingdom. Sole agency agreements have been obtained from the following firms: Sir W. G. Armstrong, Whitworth & Co., Ltd. (cranes, and dock and harbour equipments); Cammell, Laird and Co., Ltd. (for Western Canada, for steels, tires, axles, &c.); Dorman, Long & Co., Ltd. (for Western Canada, for steel beams, angles, &c.); the Power Gas Corporation, Ltd. (for Mond gas producers, &c.); Ransomes, Sims & Jefferies, Ltd. (agricultural machinery); Sandycroft Foundry Co., Ltd. (for Eastern Canada, for mining plant equipments); Willans & Robinson, Ltd. (for Eastern Canada, for steam turbines, Diesel engines and condensing plants). Negotiations are proceeding with other firms, and also for the acquisition of certain established businesses in different centres in Canada with a view to utilising their local connections. Mr. Andrews and Mr. Martin, under agreements entered into, will act as managing directors at £800 per annum each, plus 5 per cent. of the divisible profits. The Key Engineering Co., who are the vendors, have underwritten 20,000 preferred ordinary shares at a commission of £1,500 in cash. The Key Engineering Co. transfer the agency contracts to the company for £6,000 in 4,500 preferred and 30,000 deferred shares. The preliminary expenses, estimated at £2,500, exclusive of underwriting commission, will be paid by the company. Mr. Andrews has sub-underwritten 5,000 preferred shares at 5 per cent. cash commission. It is intended that the company's capital shall be principally utilised in carrying stocks of standard machinery and appliances and in executing contracts for the construction and equipment of engineering works. The company will have a London office or buying house, through which all communications with manufacturers will pass.

Consolidated Cities Light, Power and Traction Co.—This company has been offering $4,000,000 first lien 5 per cent. gold bonds at 90 (£90 per bond of $500) for subscription. The company is interested in a large number of electric power and traction and gas undertakings in the U.S.A. The list was to close on Wednesday.

Pulford Bros., Ltd.—We are informed that the 14th annual meeting of this company was held at the registered office of the company on 20th inst. Mr. Egerton G. Pulford, who presided, reported that the business during the past year showed a very satisfactory increase. Resolutions declaring a dividend of 25 per cent., free of income-tax, for the year ended March 31st last, and carrying the balance of profit to reserve fund, were passed.

Westinghouse Electric Co. (U.S.A.).—The directors have declared a quarterly dividend of 1¾ per cent. on the preferred stock.

STOCKS AND SHARES.

Tuesday Evening.

CERTAIN specialised markets have been doing all the trade this week; outside of them there is little that is exciting to record. The stocks and shares in Latin-Canadian undertakings have been soaring like rockets, attracting a good deal of business in the process—in fact, speculation is running rife in certain of the favourites, and it is rather a moot point whether the advance does not threaten to become too rapid for safety.

Home Railways are under the labour cloud which continues to depress so many of the industrial departments. Most of the steam stocks are lower, and the dividend outlook in respect of the current six months is an added factor in making prices dull. The prospect here is not pleasant at the moment, though it may alter when traffics begin to run against those of the railway strike period last year. So, while a further fall is not unlikely to take place, holders of Home Rails hug to themselves the hope that better prices may be in store for them when the holiday rush begins in August.

The announcement that the London General Omnibus Company is to be put into voluntary liquidation came as rather an unpleasant surprise to the few remaining proprietors of the company's non-assenting stock, causing a fall of 100 points, from 390 to 290, before any recovery occurred. An interim dividend of 10 per cent. was declared at the same time, and this was taken to indicate that the distribution on the 6 per cent. income bonds of the Underground Electric Railways Company will be made up to 4 per cent. in September, instead of the full rate. If this prophecy turns out to be correct, it will, of course, confirm the warning raised once or twice here as to a probable disappointment for those who were looking for 6 per cent. on their income bonds next September. The price of the bonds has shed 3 points, while the shares are ½ lower, and the 1s. shares, from 15s. 6d., fell back to 13s. 9d. Districts gave way as well, and Metropolitans fell 1, while falls of 4 occurred also in Central London Ordinary and Deferred. City and South London shed 1½, and London United Tramway Debenture fell 1. In all these concerns there is a sympathetic sentiment, which has its palpable effect upon quotations, so that if one is weak the others are influenced in the same direction. The London General Omnibus directors threaten to pay out their "non-assenting" stockholders at £275 per cent.

English Electric Supply shares are firm as a whole, with rises in Bournemouth and Poole and County Ordinary. It is stated that the Bournemouth Corporation is considering the question of purchasing the Bournemouth and Poole undertaking, which will, of course, come as no surprise to those who adopted our hint two or three weeks ago as to what was likely to happen in this case. As the County Company holds a controlling interest in the Bournemouth, the rise in the former is the natural corollary. Both Companies' Preference shares are also better. On the other hand, City Ordinary again lost 10s. on the decision of the Streets Committee of the City Corporation that it would be inexpedient to take any steps at the present time to purchase those portions of the property of the City of London and the Charing Cross Electric Supply Companies which relate to the City. Bulls of the shares, however, maintain as stoutly as ever that the recent rise was fully justified; though it will be noticed that they do not back up their convictions with purchases of shares to any appreciable extent. Metropolitans are a shade easier, but North Metropolitan Power Debentures have risen 3 points. An excellent report from the General Electric Company had the effect of raising the price of the Preference 17s. 6d. to 10¼, this following upon several improvements recently. The company has made big strides during the last year, and its net revenue has increased by £14,000, the Ordinary dividend being raised from 5 per cent. to 7½ per cent. Brush 4 per cent. Debenture stock is 2 points ower.

As mentioned above, it is in the Latin-Canadian group that the principal excitement of the week has come. To quote some of the most important movements: Mexican Light and Power Common gained 10½ (to lose 6 points later), and the Preferred put on 6½, while Rio Trams are no less than 15 up. Sao Paulo Trams rose 7, but reacted 5, and Mexico Trams are 7½ better. Shawinigan Water gained 3, Canadian General Common and Preference 2, and Mexican Northern Power jumped from 23 to 32, falling back to 31. As may be supposed, various rumours are afloat to account for these sensational rises. There is said to be an important scheme on foot for amalgamating the Sao Paulo with the Rio Tramways Company, and it is not without its significance that part of the buying should come from the Continent. The Mexican Light and Power rise is attributed to the patent fact that the revolution is over, and that the country has now settled down to the prosperity and trade which are expected to follow the recent disturbances. The rise in Mexican Northern Power is stimulated by the comparatively low price at which these shares stand, and the scope which they present for substantial improvement tacked on to the heels of the rise in other Mexican issues. It may be mentioned, by the way, that in the last-named company there are 5 per cent. bonds standing at 75, with coupons payable on January 1st and July 1st; so if the Common shares are worth anything like 31, it would seem that the bonds are too low at 75. So far as we are aware, however, the company has done no work yet, and its success or otherwise, lies all in the future. According to particulars in front of us, it is estimated that the works will be completed and power delivered in November, 1912—or, at latest, some six months afterwards.

British Columbia Electric Deferred and Preferred are both *ex* rights, and show nominal falls of about 5 points. Anglo-Argentine Trams are steady, and Rangoon Preference rose ¼.

The Telegraph market is sustained by the business in Marconis and National Telephone stock. Fluctuations in Marconis are rather less violent than they have been recently, but it seems manifest that the weak account is not yet entirely eliminated from the market. National Telephone Deferred has again fallen, though not so heavily as it did last week. United River Plate Telephones are 1/8 lower. Steady selling of West India and Panama shares put down the price ½, and Great Northern Telegraphs are £1 lower. The Anglo and Eastern groups are both firm, without showing any special feature.

Amongst Manufacturing shares, the principal change, apart from General Electrics, is a fall of 10s. in India-Rubber shares, while Telegraph Constructions are also down, and the company's Debenture fell ½. Babcock & Wilcox Preference are ¼ lower, holders taking advantage of the high price to get out and to put the money into something which yields a better rate of interest. Castner-Kellners are a shade harder on buying from the country, and Dick, Kerr Preference improved a trifle. Keen interest is taken in the latest discovery of synthetic rubber, and in spite of the criticism launched at Prof. Perkin's invention, the rubber share market has been upset by selling on the part of nervous holders.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Fortnight ended.	Receipts for the fortnight. £	Receipts for the fortnight. £*	No. of wks.	Total to date. £	Total to date. £*	Route miles open.	Inc.
Aberdeen	June 19	3,036	+ 64	3	4,269	— 359	14·4	..
Ayr	„ 22	684	+ 61	5	1,731	— 26	8	..
†Bath	..	..	..	..	..	..	..	..
Birkenhead	„ 23	2,805	— 8	11	18,507	— 595	13·68	..
Birmingham Corp.	„ 15	20,805	+5,804	11	115,597	+34,000	57·17	..
Blackburn	„ 19	2,854	+ 158	12½	14,750	— 100	14·62	..
Blackpool Corp.	„ 20	2,281	— 510	..	14,399	+ 1,534	11·87	..
Blackpool-Fleetw'd	„ 22	1,486	— 288	24	11,597	+ 251	8	..
Bournemouth	„ 19	3,418	+ 95	11⅞	20,920	+ 856	21·95	..
Bradford	„ 15	10,857	—1,721	11	62,234	— 707	56	1·2
Brighton	„ 23	2,011	— 101	12	11,924	— 632	9·5	..
Bristol	„ 21	13,687	+ 258	..	162,960	+13,147	30·5	..
Brit. Elec. Trac. Co.								
Airdrie	„ 14	610	+ 139	24	6,835	+ 1,695	3·65	..
Barnsley	„ 14	362	— 40	„	3,933	— 377	..	..
Barrow	„ 14	795	+ 59	„	8,815	+ 2,118	5·37	..
Devonport	„ 14	1,189	+ 25	„	12,693	+ 1,795	8·85	..
Gateshead	„ 14	2,107	+ 104	„	23,904	— 155	11·35	..
Gravesend	„ 14	398	— 128	„	4,840	+ 153	6·5	..
Greenock	„ 14	1,707	+ 29	„	18,307	+ 2,224	7·25	..
Harilepool	„ 14	440	— 269	„	5,472	+ 189	6·72	..
Kidderminster	„ 14	212	— 189	„	2,525	+ 97	..	..
‡Leamington	„ 14	395	— 114	„	3,921	+ 257	..	..
Merthyr	„ 14	385	— 156	„	4,864	— 496	2·9	..
Metropolitan	„ 14	18,005	—3,161	„	207,497	+ 7,997	22	..
Middleton	„ 14	780	— 206	„	7,618	— 119	8·5	..
Mid. Joint Com'tee	„ 14	6,218	—1,476	„	74,952	+ 2,977	..	..
Oldham—Ashton	„ 14	1,324	— 17	„	14,304	+ 1,007	9·13	..
Peterborough	„ 14	268	— 47	„	2,890	+ 2 6	5·31	..
Potteries	„ 14	3,832	— 267	„	43,180	— 2,404	29	..
Rothesay	„ 14	592	— 66	„	2,557	+ 45	2·75	..
Southport	„ 14	674	— 272	„	6,760	— 37	8·17	..
S. Metropolitan	„ 14	1,851	— 418	„	19,563	+ 457	..	..
Swansea	„ 14	2,169	— 3 7	„	26,146	+ 129	12·5	..
Tynemouth	„ 14	454	— 498	„	4,490	— 236	3·75	..
Weston-s-Mare	„ 14	298	— 425	„	1,664	— 240	3	..
‡Worcester	„ 14	650	— 156	„	6,435	— 6	5·75	..
Wrexham	„ 14	216	— 29	„	2,543	+ 245	..	..
Yorks. Wool. Dist.	„ 14	2,165	— 201	„	25 187	+ 756	17	..
Miscellaneous	„ 14	478	— 101	„	5,190	+ 111	..	..
Burnley	„ 21	2,891	+ 147	..	..	..	11·73	..
Burton-on-Trent	„ 21	551	— 179	12	3,690	— 200	10	..
Bury	„ 13	2,591	+ 97	12	18,063	+ 1 3	22·5	..
Cardiff	„ 15	5,276	— 167	11	24.807	— 2,547	17·35	..
Chatham and Dist.	„ 20	1,751	— 41	25	20,234	+ 44	14·98	..
Cork	„ 20	1,061	— 11	25	11,656	— 212	9·89	..
Croydon	„ 14	3,772	— 425	11	2,631	+ 105	11·6	·75
†Darlington	„ 15	283	+ 19	11	2,395	+ 51	4·87	..
Darwen	„ 21	554	— 2	12	3,864	..	4·36	..
Dover	„ 15	486	— 77	11	2,570	— 105	4·75	..
Dublin	„ 21	12,850	+ 265	21	110,541	+ 6,334	54·25	..
East Ham	„ 22	2,049	— 241	12	12,7 8	— 187	7·87	..
Exeter	„ 21	667	— 100	12	3,878	— 316	5·5	..
Glasgow	„ 22	38,651	+1,102	..	61,577	— 1,354	98	·25
Hastings	„ 24	1,928	— 110	..	..	— 1,014	19·3	..
Huddersfield	„ 22	3,978	+ 205	12	23,881	+ 82	21·5	1
Hull	„ 22	5,840	— 355	12	31 063	— 949	18 5	—1
Ilkeston	„ 20	231	— 8	12	1,061	— 589	..	..
†Ipswich	„ 22	435	+ 11	12	5,249	— 5	10·5	..
Kilmarnock	„ 22	324	— 4	5	905	— 23	4·25	..
Lancashire United	„ 19	2,692	— 123	25	31,736	— 358	39	..
Leeds	„ 24	15,498	—1,077	12	93 174	+ 2,906	112·7	..
Leicester	„ 22	5,340	— 378	..	..	..	20	..
†Leith	„ 15	690	+ 36	4½	3,028	— 14	8·724	..
Liverpool	„ 15	23 962	— 788	25½	280,435	+11,480	10½	..
‡L.C.C.	„ 12	85,869	—8,812	..	4 8,977	— 8,630	140·2	1·5
London United	„ 22	13,194	—2,744	25	153,352	— 4,316	..	..
Lowestoft	„ 22	312	— 135	28	5,570	— 361	3·5	..
Manchester	„ 22	33,564	+1,448	12	202,209	+ 7,302	105	..
Newcastle	„ 22	8,769	—2,428	..	50 622	— 2,090	31·3	..
Newport	„ 22	1,417	— 397	12	8,151	— 912	7·25	..
Oldham	„ 23	4 014	+ 113	13	26,645	+ 344	23	..
Pontypridd	„ 22	703	— 58	12	4,175	— 1,005	5 5	..
Portsmouth	„ 15	4,830	— 84	11	23,544	— 238	15·75	..
Preston	„ 19	1,570	— 22	12	9,673	+ 2 8	10	..
Rotherham	„ 19	1,443	+ 103	11⅞	7,944	+ 149	12	..
†Salford	„ 17	4 97	+ 531	11	57,2 1	+ 1,534	41	..
Sheffield	„ 25	13,688	+ 931	..	84,076	+ 1,000	40	..
Southampton	„ 19	2,503	— 67	11	14,210	+ 638	11	..
Southend-on-Sea	„ 19	741	+ 147	12	8,461	+ 1,147	7	..
South Shields	„ 15	1,215	— 214	..	6,580	— 208	10·25	..
Tyneside	„ 19	988	— 819	25	11,354	— 473	11	..
Wallasey	„ 22	2,271	— 115	11⅞	13,254	— 527	8·72	..
Walthamstow	„ 22	1,652	— 25	12	9,604	+ 8	9	..
West Ham	„ 13	5,100	— 204	10½	29,042	— 2 8	16·45	1
Wolverhampton	„ 19	1,967	+ 100	12	11,716	+ 136	13·75	..
Cen. London Rly.	„ 22	6,987	—4,204	25	115,768	—16,889	6·32	..
City & S. Lon. Rly.	„ 23	5 720	—1,403	25	78,893	— 5 902	7·26	..
Dublin-Lucan Rly.	„ 21	324	— 8	25	3,998	+ 70	7	..
G.N. and City Rly.	„ 21	3,123	+ 45	25	40,888	+ 2,410	3·5	..
L'pool Overh'd Rly.	„ 23	3,206	+ 264	25	34,835	+ 2,644	6·6	..
Llandudno-Col. Bay	„ 21	645	— 48	2 ⅛	5,771	+ 305	6 5	..
Lond. Elec. Ry. Co.	„ 22	26,970	—9,645	25	351,940	— 5,155	21·26	..
Mersey Railway	„ 22	4 615	+ 454	25	52,501	+ 6 8	4·5	..
Metropolitan Rly.	„ 23	36,462	—2,318	25	418,149	—12,038	25·75	..
Met. District Rly.	„ 21	25,793	—5,041	25	314,743	+ 8,129	25	..
Anglo-Argentine	„ 17	101,713	+4,070	25	1,385,271	+46 610	..	..
‡Auckland	May 31	18 179	+1,090	..	202 987	+16,660	23·31	..
Bombay (B.E.T.)	„ 24	5,977	+ 365	21	63,717	+ 9,901	..	..
‡Brisbane	..	..	..	..	..	..	..	..
Brit. Columbia Rly.	..	..	..	..	..	..	..	..
Calcutta	June 22	7,125	+ 318	..	..	..	..	..
Cape Electric T.Ld.	..	..	..	..	..	..	..	..
‡Kalgoorlie, W.A.	May	8,270	..	5	15,803	..	20·5	..
‡Lisbon	..	..	..	..	..	..	..	..
Madras	May 31	1,798	+ 387	..	16 653	+ 1,931	13·5	·75
‡Montevideo	May	26 669	+10 852	7	212,030	+29,536	..	..
Perth (W.A.)	June 21	3,571	+ 429	..	46,861	+ 6,704	29	..

* Compared with the corresponding period of 1911. † One week only.
‡ Includes horse, steam and other receipts. § One month.

SHARE LIST OF ELECTRICAL COMPANIES.

ENGLISH ELECTRICITY SUPPLY AND POWER COMPANIES.

NAME.	Stock or Share.	Dividends for		Closing Quotations June 25th.	Rise + or Fall —	Present Yield p.c.
	*	1910.	1911.			£ s. d.
Bournemouth & Poole, Ord. ..	10	5½	5½	9⅜ — 10⅜	+ ⅛	5 2 4
Do. 4½ % Pref.	10	4½	4½	9 — 10	+ ⅛	4 10 0
Do. Second 6 % Pref. ..	10	6	6	10¼ — 11	..	5 9 1
Do. 4½ % Deb. Stock ..	Stock	4½	4½	100 —102	..	4 8 3
Brompton & Kensington, Ord...	5	10	10†	8¾ — 8⅞	..	5 14 3
Do. 7 % Cum. Pref.	5	7	7	7⅞ — 8⅛	..	4 6 2
Central Electric Supply, 4 % Guar. Deb.	100	4	4	97 —100	..	4 0 0
Charing Cross, West End & City	5	5	5	4½ — 5	..	5 0 0
Do. 4½ % Cum. Pref.	5	4½	4½	4¼ — 4⅜	..	4 17 4
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	8¾ — 4⅜	..	5 2 10
Do. Do. 4 % Deb... ..	100	4	4	£4 — £6 xd	+1	4 3 4
Chelsea, Ord.	5	5	5	4⅜ — 4½	..	5 2 7
Do. 4½ % Deb.	Stock	4½	4½	99 —102	..	4 8 3
City of London, Ord.	10	7	8	17 — 19	— ½	4 4 3
Do. 6 % Cum. Pref.	10	6	6	15 — 17	..	3 10 7
Do. 5 % Deb.	Stock	5	5	119 —123	..	4 1 4
Do. 4½ % Second Deb. ..	100	4½	4½	101 —104	..	4 6 7
County of London, Ord... ..	10	5	6	10⅝ — 1⅛	+ ⅛	5 5 6
Do. 6 % Pref.	10	6	6	11½ — 12	+ ⅛	5 0 0
Do. 4½ % Deb.	Stock	4½	4½	108 —110	..	4 1 10
Do. 4½ % Second Deb. ..	Stock	4½	4½	100 —103	..	4 8 3
Edmundson's, Ord.	5	Nil	Nil	7/16 — 1/16	— 1/16	Nil
Do. 6 % Cum. Pref.	5	Nil	Nil	3⅛ — 3½	..	Nil
Do. 4½ % First Mort. Deb. ..	100	4½	4½	86 — 89	..	5 1 2
Folkestone	5	6	6	4⅜ — 5⅛	..	5 14 3
Do. 5 % Cum. Pref.	5	5	5	4⅜ — 5⅛	..	4 15 3
Do. 4½ % First Deb.	100	4½	4½	94 — 97	..	4 12 9
Hove	5	9	9	6⅜ — 7½	..	6 4 2

NAME.	Stock or Share.	Dividends for		Closing Quotations June 25th.	Rise + or Fall —	Present Yield p.c.
	*	1910.	1911.			£ s. d.
Kensington & Knightsbridge, Ord	5	9	9	7½ — 7¾	..	5 16 2
Do. 4 % Deb.	Stock	4	4	92 — 95	..	4 4 8
Kent Elec. Power, 4½ % Deb. ..	Stock	4½	4½	80 — 84	..	5 7 2
London Electric, Ord.	8	2	2½	1⅛ — 1⅜	..	4 5 6
Do. 6 % Pref.	5	6	6	4⅜ — 5⅛	..	5 14 3
Do. 4 % First Mort. Deb. ..	Stock	4	4	90 — 93 xd	..	4 6 0
Metropolitan	5	5	4	3⅛ — 4	— ⅛	6 1 3
Do. 4½ % Cum. Pref.	5	4½	4½	4⅜ — 4⅝	..	4 14 9
Do. 4½ % First Mort. Deb. ..	Stock	4½	4½	101 —104	..	4 6 7
Do. 3½ % Mort. Deb.	Stock	3½	3½	85 — 88	..	3 19 7
Midland Electric Corporation 4½ % First Mort. Deb.	100	4½	4½	96 — 98	..	4 11 10
Newcastle-on-Tyne 5 % Pref., Non-Cum.	5	5	5	4½ — 5	..	5 0 0
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	100 —103	+3	4 17 1
Notting Hill, 6 % Non-Cum. Pref.	10	..	6	10½ — 11½	..	5 6 8
Oxford	5	7½	7½	5⅞ — 6⅛	..	5 13 9
St. James' and Pall Mall, Ord.	5	10	10	8 — 8⅛	..	5 14 3
Do. 7 % Pref.	5	7	7	6⅞ — 7⅛	..	4 15 0
Do. 3½ % Deb.	100	3½	3½	86 — 87	..	4 0 6
Smithfield Markets, Ord. ..	5	Nil	2	1⅜ — 1⅞	..	..
South London, Ord.	4	5	5	2⅝ — 3⅛	..	6 8 0
Do. 5 % First Mort. Deb. ..	100	5	5	100—103	..	4 17 1
South Metropolitan, 7 % Pref...	1	7	7	1 5/32 — 1 5/32	..	6 1 0
Do. 4½ % First Deb. Stock ..	100	4½	4½	96 — 99	..	4 11 0
Urban, Ord...	£8	5	..	2 — 2	..	..
Do. 5 % Cum. Pref.	5	5	2	2⅛ — 3	..	3 6 8
Do. 4½ % First Mort. Deb. ..	100	4½	4½	86 — 88	..	5 2 3
Westminster, Ord.	5	10	10	8½ — 8¾	..	5 14 3
Do. 4½ % Cum. Pref.	5	4½	4½	5⅛ — 5⅜	..	4 4 8

COLONIAL AND FOREIGN ELECTRICITY SUPPLY AND POWER.

Adelaide, 6 % Pref.	5	6	6	5⅞ — 5⅞	..	5 2 2
Calcutta, Ord.	5	8½	8½	7⅞ — 7⅞	..	5 11 6
Do. 5 % Pref.	5	5	5	5⅛ — 5⅜	..	4 15 3
Calgary Power, 1st Mort. Bds.	100	5	5	97½ — 99½	..	5 0 6
Canadian Gen. Eli. Com. ..	$100	7	7†	114 —118	+2	5 18 8
Do. 7 % Pref.	$100	7	7	120 —124	+2	5 13 0
Cordoba Lt., Power and T., Ord.	1	3	3†	1/8 — 1/8	..	3 4 0
Do. 5 % Deb.	100	5	..	94 — 97	..	5 3 1
Elec. Lt. and P. of Cochabamba, 6 % Bonds	100	6	6	91½ — 93½ xd	..	6 8 4
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	88 — 86	..	5 16 3
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	94½ — 96½	..	5 3 8
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	..	1/16 — 3/16	— 1/16	Nil
Do. 6 % Pref.	1	6	6	3/32 — 5/32	..	8 6 0
Kaministiquia Power, 5 % G. Bs.	$500	5	5	106 —108	..	4 12 7
Madras, Ord.	5	..	..	2¼ — 2⅜	..	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	104 —107	..	4 13 6
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	91 — 93	..	5 7 6
Mexican Lt. & Power, Common	$100	4	4	94 — 99	+4½	4 0 10
Do. 7 % Cum. Pref.	$100	7	7	111 —114	+6½	6 2 10
Do. 5 % 1st Mort. Gold Bds.	..	5	5	98½ — 100½	+1	4 19 6

Monterey Rly. Light & Power, 5 % 1st Mort. Deb.	100	5	5	89½ — 91½	+ 1	5 9 3
Montreal, Lt., H. and Power ..	$100	7	8	211 —215	..	3 14 5
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5	5	39 — 42	..	11 18 2
River Plate, Ord.	Stock	10	10	240 —250	..	4 0 0
Do. 6 % Non-Cum. Pref. ..	Do.	6	6	109 —114	..	5 5 3
Do. 5 % Deb. Stock	Do.	5	5	103 —105	..	4 15 3
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	99 —101	..	4 9 1
Shawinigan Water, Capital ..	$100	4	5†	142 —146	+ 3	3 8 6
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	111½—113½	..	4 8 1
Do. 4½ % Per. Deb.	Stock	4½	4½	104 —106	+ 1	4 5 0
Toronto Power, 4½ % Deb. ..	Do.	4½	4½	98½—100½ xd	..	4 9 7
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	92½— 94½	..	5 5 10
Victoria Falls Power, Pref. ..	1	Nil	11¼d.	1/16 — 1	..	..
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	6	6	105½—107½	..	5 11 7

TELEGRAPH AND TELEPHONE COMPANIES.

Amazon Telegraph	10	Nil	4†	7⅛ — 7⅜	..	..
Do. 5 % Deb. Red.	Stock	5	5	97½ — 99½	..	5 0 6
American Telep. & Teleg., Cap.	$100	8	8†	148½—150½	..	5 6 4
Do. Collat. Trust	$1000	4	4	96½ — 97½	..	4 2 1
Anglo-American Telegraph ..	Stock	3½	3	65 — 67	..	4 9 7
Do. 6 % Pref.	Do.	6	6	109½—110½	+ ½	5 8 10
Do. Def.	Do.	30/-	30/-	25½ — 25¾	— ¼	5 16 6
Anglo - Portuguese Tel., 5 % Mort. Deb.	100	5	5	102½—104½	+ ½	4 16 2
Chili Telephone	5	7	..	7⅞ — 8	..	4 10 4
Commercial Cable, Stlg. 4 % Deb.	Stock	4	4	82½ — 84½	+ ½	4 14 8
Cuba Telegraph	10	6	6†	9⅜ — 10⅜	..	5 14 3
Do. 10 % Pref.	10	10	10	16⅜ — 17⅜	..	5 14 3
Direct Spanish Telegraph, Ord.	5	4	4†	8¼ — 8⅜	..	5 6 8
Do. 10 % Cum. Pref.	5	10	10	7 — 7⅛	..	6 9 0
Direct United States Cable ..	10	4½	5	7⅜ — 7⅝	..	6 7 0
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	99 —101	..	4 9 1
Eastern Telegraph, Ord. Stock	Stock	7	5†	130 —133	..	5 5 3
Do. 3½ % Pref. Stock.. ..	Do.	3½	3½	77½ — 79½	— ⅛	4 8 1
Do. 4 % Mort. Deb.	Do.	4	4	99 —101	..	3 19 3
Eastern Extension	10	7	5†	13⅞ — 13¾	..	5 5 8
Do. 4 % Deb.	Stock	4	4	99 —101	..	3 19 3
East and S. Africa Tel. 4 % Mt. Db. Mauritius Sub.	25	4	4	97 —100	..	4 0 0
Globe Telegraph and Trust ..	10	5½	6†	11 — 11½	..	5 4 4
Do. 6 % Pref.	10	6	6	12⅜ — 12⅝	— ⅛	4 9 9
Great Northern Telegraph ..	10	18	18	27½ — 28½	— 1	6 6 4
Indo-European Telegraph ..	25	13	5†	56 — 58	..	5 3 5
Mackay Companies Common ..	$100	5	5	88 — 91 xd	..	5 10 0
Do. 4 % Cum. Pref.	$100	4	4	70 — 73 xd	..	5 9 7
Marconi's Wireless Telegraph	1	5	20	6 — 6⅛	— ⅛	3 5 4
Do. 7 % Cum. Partic. Pref.	1	16	17	5¼ — 5⅜	— ⅛	3 1 10

Monte Video Telephone, Ord. ..	1	6	6	1 — 1⅛	..	5 6 3
Do. 5 % Pref.	1	5	5	⅜ — ½	..	5 14 3
National Telephone, Pref. ..	Stock	6	6	100 —103	..	..
Do. Def.	Do.	6	6	142 —144	—1	..
Do. 5 % Non-cum. 3rd Pref.	5	5	5	5⅞ — 6⅛	— ⅛	..
New York Telep., 4½ % Gen. Bnds.	100	4½	4½	99 —100	..	4 10 0
Oriental Telep. and Elec. ..	1	8	8	1⅛ — 1⅜	..	4 13 0
Do. 6 % Cum. Pref.	1	6	6	1⅛ — 1⅛	..	4 16 0
Do. 4 % Red. Deb.	Stock	4	4	89 — 91	..	4 8 0
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	100 —102	..	3 18 5
Reuter's	8	5	5†	11½ — 11¾	..	3 8 0
Submarine Cables Trust ..	Cert.	6	6	127 —130	..	4 12 4
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	99½—101½	..	4 8 8
United River Plate Telephone	5	8	8	7⅝ — 7⅞	—1/16	5 1 7
Do. 5 % Cum. Pref.	5	5	5	5⅛ — 5⅜	..	4 8 11
West Coast of America	2½	2½	2½	1⅛ — 1⅛	..	4 0 0
Do. 4 % Debs., 1 to 1,500 guar. by Bras. Sub. Tel.	100	4	4	96 — 99	+ 1	4 0 10
West India and Panama Teleg.	10	1½	½	2⅝ — 2⅞	— ⅛	1 14 9
Do. 6 % Cum. 1st Pref. ..	10	6	6	10¼ — 10½	..	5 11 7
Do. 6 % Cum. 2nd Pref. ..	10	6	6	9⅞ — 10⅛	..	5 17 1
Do. 5 % Debs.	100	5	5	102½—104½	..	4 15 8
Western Telegraph, Ltd. ..	10	7	6†	13⅛ — 13⅝	..	5 2 9
Do. 4 % Deb.	Stock	4	4	98 —100	..	4 0 0
Western Union 4½ % Fdg. Bonds	$1000	4½	4½	100 —103	..	4 7 8

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

Continued on next page

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for 1910.	Dividends for 1911.	Closing Quotations June 25th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bath Trams, Pref. Ord.	1	Nil	Nil	⅞ — 1⅛	..	Nil
Do. 5 % Pref.	1	5	5	1 1/16 — 1⅛	..	6 8 1
Do. 4½ % Deb.	100	4½	4½	78 — 83	..	5 8 5
Brit. Elec. Trac., 6 % Pref.	100	..	..	11 — 13	..	..
Do. Do. Deferred	100	..	..	6 — 8	..	..
Do. Do. 6 % Cum. Pr'f.	100	..	6	93 — 95	−½	6 6 4
Do. 7 % Non-Cum. Pr'f.	100	..	..	41 — 45	−1	..
Do. 5 % Perp. Deb.	100	5	5	98 — 97	..	5 3 1
Do. 4½ % 2nd Deb.	100	4½	4½	80 — 84	..	5 7 2
Central London Railway, Ord.	100	3	3	75 — 77	−4	3 18 0
Do. Pref.	100	4	4	84 — 86	..	4 13 0
Do. Def.	100	2	2	74 — 76	−4	2 12 8
Do. 4 % Deb.	100	4	4	101 —103	..	3 17 8
City & South London, Ord.	100	1½	1⅝	36½ — 37½	−1½	4 6 8
Do. 5 % Pref., 1891	100	5	5	108 —110	..	4 11 0
Do. Do. 1896	100	5	5	104 —106	..	4 15 3
Do. Do. 1901	100	5	5	104 —106	..	4 14 4
Do. Do. 1908	100	5	5	103 —105	..	4 15 3
Do. 4 % Deb.	100	4	4	99 —101	..	3 19 3
Dublin United Trams, 6 % Pref.	10	6	6	10⅝ — 11⅜	..	5 2 2
Great Northern & City, Pr'f. Ord	10	Nil	..	1⅜ — 1⅝	..	Nil
Hastings Trams, 6 % Pref.	5	Nil	6	¾ — ⅞	..	8 0 0
Do. 4½ % Deb.	100	4½	4½	71 — 76	..	5 18 5
Isle of Thanet Trams, 5 % Pref.	5	2½	2½	2¼ — 2⅜	..	4 11 0
Do. 4 % Deb.	100	4	4	75 — 80	..	5 0 0
Lancashire United, 5 % Deb.	100	5	5	83 — 85	..	5 17 8
London Elec. Railw'ys, 4 % Deb.	100	4	4	97 — 99	..	4 0 10
London United Trams, 5 % Pref.	10	Nil	..	5⅛ — 5⅜	..	..
Do. 4 % Deb.	100	4	4	76 — 79	−1	5 1 3
Metropolitan Railway Consol.	100	1⅜	1⅞	63½ — 64	−1	2 18 7
Do. Surplus Lands	100	2⅜	2⅝	67 — 69	..	4 3 4
Do. 5½ % Deb.	100	5½	5½	89 — 91	..	3 16 11
Do. 5½ % Pref.	100	5½	5½	86 — 88	..	3 19 7
Do. 5½ % Con. Pref.	100	5½	5½	87 — 89	..	3 18 8
Metropolitan District Ord.	100	Nil	..	41⅜ — 42½	−¾	Nil
Do. 6 % Deb.	100	6	6	144 —146	..	4 2 2
Do. 4 % Deb.	100	4	4	96 — 98	..	4 1 8
Do. 4 % Prior Lien	100	4	4	99 —101	..	3 19 3
Do. 4½ % First Pref.	100	3½	4½	90 — 92	..	4 17 10
Do. 5½ % Gtd.	100	5½	5½	76 — 78	..	4 9 9
Metropolitan Elec. Trams, Ord.	1	5½	6	⅞ — 1	..	6 0 0
Do. Def.	1	Nil	..	⅛ — 7/16	..	Nil
Do. 5 % Pref.	1	5	5	3/16 — 5/16	..	5 10 6
Do. 4½ % Deb.	100	4½	4½	98 —100	..	4 10 0
Do. 5 % Deb.	100	5	5	98 —100	..	5 0 0
Potteries, Ord.	1	2	..	5/16 — 7/16	..	..
Do. 5 % Pref.	1	5	5	⅜ — ½	..	6 13 4
Do. 4½ % Deb.	100	4½	4½	87 — 90	..	5 0 0
South Metro. Trams, 6 % Pref.	1	6	..	1 1/16 — 1⅛	..	7 7 8
Do. 4 % Deb.	100	4	4	72 — 77	..	5 4 0
Underground Elec. Railways	10	..	..	4 — 4½	−⅛	Nil
Do. 4½ % Bonds	100	4½	4½	100 —102	+1	4 8 3
Do. 6 % Income	100	1	1½†	87 — 89	−3	..
Yorkshire (West Riding), Ord.	5	Nil	..	⅛ — ¼	..	Nil
Do. 6 % Pref.	5	Nil	..	3 — 3½	..	Nil
Do. 4½ % Deb.	100	4½	4½	80 — 84	..	5 7 2

ELECTRICAL RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref.	5	5	5½	5 1/16 — 5 7/16 xd	..	5 1 2
Do. 2nd Pref.	5	5	5½	4 15/16 — 5 3/16 xd	..	5 6 0
Do. 4 % Deb.	100	4	4	94½ — 96 xd	..	4 3 4
Do. 4½ % Deb.	100	4½	4½	99½ —101½	..	4 8 8
Do. 5 % Deb.	100	5	5	101 —103	..	4 17 1
Auckland Trams, 5 % Deb.	100	5	5	104 —106	..	4 14 4
Bombay Elec. S. & Trams, Pref.	10	6	6	11⅛ — 11⅝	..	5 3 3
Do. 4½ % Deb.	100	4½	4½	98 —100	..	4 10 0
Do. 5 % 2nd Deb.	100	5	5	99 —101	..	4 19 0
Brisbane Trams Invt., Ord.	5	8	8	7 — 7⅛	+ ⅛	5 6 8
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 15 3
Do. 4½ % Deb.	100	4½	4½	101 —104	+1	4 6 7
B. Columbia Elec. Rly., Def.	100	8	8†	135 —140xrts	..	5 14 4
Do. Pref. Ord.	100	6	6	118 —123xrts	..	4 17 7
Do. 5 % Pref.	100	5	5	107 —110	−4	4 11 0
Do. 4½ % 1st Mort. Deb.	40	4½	4½	99½ —102½	..	4 7 10
Do. 4½ % Vancouver Deb.	100	4½	4½	103 —105	..	4 5 9
Do. 4½ % Con. Deb.	100	4½	4½	102½ —104½	..	4 6 2
Calcutta Trams, Ord.	5	6	7	6⅛ — 6⅝	..	5 5 8
Do. 5 % Pref.	5	5	5	4 15/16 — 5 1/16	..	4 16 5
Do. 4½ % Deb.	100	4½	4½	101 —104	+1	4 6 7
Cape Electric Trams	1	Nil	2½†	⅜ — ½	..	..
City Buenos Aires Trams (1904)	5	5	5	5 1/16 — 5 3/16	..	4 10 6
Do. 4 % Deb.	100	5	5	101 — 103	..	4 17 3
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	94 — 98	..	5 2 0
Havana Elec. Rly., 5 % Bonds	$1000	5	5	100 —103	−1	4 17 2
Kalgoorlie Elec. Trams	1	Nil	..	1/16 — 3/16	..	Nil
Do. 5 % A Deb.	100	5	5	8½ — 9⅜ xd	..	5 7 6
Do. 6 % B Deb.	100	5	6†	56 — 60	..	10 0 0
La Plata Elec. Trms, Ord.	1	..	..	1/16 — 3/16	..	..
Do. Pref.	1	6	6	⅞ — 1	..	6 0 0
Lisbon Elec. Trams, Ord.	1	5½	6	1 — 1⅛	..	4 8 0
Do. 6 % Pref.	1	6	6	1 — 1⅛	..	4 16 0
Do. 5 % Deb.	100	5	5	94 — 98	..	5 2 0
Madras Elec. Tr. (1904), Deb.	100	5	5	102 —104	..	4 16 2
Manaos Trams & Lt., 1st Deb.	100	5	5	92 — 95	..	5 5 3
Manila Elec. R. and Ltg., Bonds	$1000	5	5	103 —105	+1	4 15 2
Mexico Trams Con.	$100	7	7	130 —133	+7½	5 5 3
Do. Gen. Con. 5 % Bonds	..	5	5	98½ —100½	..	4 19 6
Do. 6 % Bonds	100	6	6	105 —107	+1	5 12 2
Para Elec. Rlys. & Lt., Ord.	5	10	10	6⅞ — 7⅛	..	6 18 0
Do. 6 % Pref.	5	6	6	5 — 5⅛	..	7 0 4
Do. 5 % 1st Deb.	100	5	5	100 —102	..	4 18 0
Perth (W.A.) Elec. Tr., Ord.	1	2½	..	1 1/16 — 1 1/16	..	1 18 4
Do. 5 % 1st. Deb.	100	5	5	101 —104	..	4 16 2
Rangoon El. Tr. & Sup., Pref.	5	6	6	5⅜ — 5⅞	+ ⅛	5 11 7
Do. 4½ % 1st Deb.	100	4½	4½	99 —101	..	4 9 1
Rio de Janeiro Trams	$100	4½	5†	156½ —158½	+15	3 3 1
Do. 1st Mort. 5 % Bonds	..	5	5	106 —107	..	4 13 6
Do. 5 % Mort. Bonds	100	5	5	99 —100	..	5 0 0
Sao Paulo Tram, Lt. and P.	$100	10	10†	250 —255	+2	3 18 5
Do. 5 % 1st Deb.	$500	5	5	105 —107	−⅛	4 13 6
Singapore Trams, 5 % Deb.	100	5	5	80 — 83	..	6 0 6
Southern El. Tr. B.A., 5 % Deb.	100	5	5	96 — 98	..	5 2 0
Un. Elec. Trams Monte Video	5	6	7	5⅝ — 6⅛	+ ⅛	5 14 3
Do. 6 % Pref.	5	6	6	5 — 5⅛	..	5 14 3
Do. 5 % 1st Deb.	100	5	5	100 —103	..	4 17 1
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	104½ —106½	..	4 4 6

MANUFACTURING COMPANIES.

Aron, Ord.	1	Nil	6	1/16 — 1/8	..	7 7 8
Do. 6 % Pref.	1	9	6	⅝ — ¾	..	7 2 2
Babcock & Wilcox	1	26	28	3½ — 3⅝	−⅛	..
Do. Pref.	1	6	6	1⅛ — 1⅛	−⅛	4 0 0
B.I. & Helsby Cables	5	10	10	7⅞ — 8⅛	..	6 1 3
Do. Pref.	5	6	6	6½ — 6⅝	..	4 9 0
Do. Deb.	100	4½	4½	101 —103	..	4 7 5
British Thomson-Houston, Deb.	100	4½	4½	96 — 98	..	4 11 10
British Westinghouse, Pref.	3	Nil	..	1/16 — 1/8	..	Nil
Do. Deb.	100	4	4	61 — 64	..	6 5 0
Do. 6 % Prior Lien	100	6	6	103 —105	+1	5 14 3
Browett, Lindley, Ord.	1	Nil	..	1/6 — 2/-	..	Nil
Do. Pref.	1	Nil	..	5/- — 6/-	..	Nil
Brush, 7 % Pref.	2	Nil	..	0 — ⅛	..	Nil
Do. 5 % Prior Lien Deb.	100	5	5	77½ — 82½	..	6 1 3
Do. 4½ % Deb.	100	4½	4½	52 — 57	−2	7 17 10
Do. 4½ % Second Deb.	100	4½	4½	37 — 42	..	10 14 4
Callender's Cable	5	15	10†	10⅜ — 11½	..	6 10 5
Do. Pref.	5	5	5	5 — 5⅛	..	4 15 3
Do. Deb.	100	4½	4½	100 —102	..	4 8 3
Casmer-Kellner	1	17½	20	3 3/16 — 3 5/16	+ 1/16	5 8 1
Do. Deb.	100	4½	4½	105 —109	..	4 10 7
Crompton & Co.	3	Nil	Nil	⅛ — ⅜	..	Nil
Do. Deb.	100	5	5	58 — 68	..	7 7 1
Dick, Kerr	1	5	..	3/16 — 3/16	..	5 8 1
Do. Pref.	1	6	6	1 — 1⅛	+ 1/16	5 6 8
Do. Deb.	100	4½	4½	97 —100	..	4 10 0
Edison & Swan, A, £8 paid	5	Nil	..	0 — 1/8	..	Nil
Do. fully paid	5	Nil	..	1/8 — 2/8	..	Nil
Do. 4 % Deb.	100	4	4	68 — 72	..	5 11 1
Do. 5 % Second Deb.	100	5	5	75 — 78	..	6 8 2
Electric Construction	2	Nil	2½†	½ — 1	..	..
Do. Pref.	2	7	7	1½ — 2	..	7 0 0
Greenwood & Batley, Pref.	10	7	7	7⅞ — 8½	..	8 5 8
Do. Deb.	100	5	5	94 — 96	..	5 4 2
General Electric, Pref.	10	5	5	10 — 10½	+ 1/8	4 15 3
Do. Deb.	100	4	4	85 — 90	..	4 8 11
Henley's, Ord.	5	15	10†	11⅜ — 12½	..	6 0 0
Do. Pref.	5	4½	4½	4 1/16 — 5 3/16	..	4 6 9
Do. Deb.	100	4½	4½	101 —103	..	4 7 5
India-Rubber, G. & T.	10	10	..	7⅛ — 8⅛	— ⅛	..
Do. Pref.	10	5	5	9½ — 10½	+ ½	4 17 7
Telegraph Construction	12	20	10†	32½ — 34½	— ½	6 17 0
Do. Deb.	100	4	4	99 —101	— ⅛	3 19 3
Willans & Robinson	1	Nil	..	⅛ — ¼	..	Nil
Do. Pref.	5	Nil	..	½ — 1	..	Nil
Do. Deb.	100	4	4	58 — 60	..	6 13 4

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

TRADE STATISTICS OF MEXICO.

THE following figures, showing the imports of electrical and similar materials into Mexico during the year ended June 30th, 1911, are taken from the recently-issued official trade statistics: the figures for the previous year are given for purposes of comparison, with notes of increases or decreases:—

Peso = 4s.

	1909-10. Pesos.	1910-11. Pesos.	Increase or decrease. Pesos.
Copper, brass or bronze wire, covered with other materials.—			
From Germany	70,000	83,000	+ 13,000
„ Austria	1,000	2,000	+ 1,000
„ United States ...	389,000	461,000	+ 72,000
„ France	—	1,000	+ 1,000
„ Great Britain ...	1,000	4,000	+ 3,000
„ Other countries ...	—	9,000	+ 9,000
Total ...	461,000	560,000	+ 99,000
Copper, brass or bronze wire, bare.—			
From Germany	26,000	40,000	+ 14,000
„ United States ...	119,000	364,000	+ 245,000
„ Great Britain ...	11,000	9,000	— 2,000
„ Other countries ...	13,000	7,000	— 6,000
Total ...	169,000	420,000	+ 251,000
Cables of copper, brass, &c., not armoured.—			
From Germany	41,000	23,000	— 18,000
„ Austria	4,000	8,000	+ 4,000
„ United States ...	242,000	231,000	— 11,000
„ Great Britain ...	2,000	20,000	+ 18,000
„ Other countries ...	4,000	30,000	+ 26,000
Total ...	293,000	312,000	+ 19,000
Cables of copper, &c., armoured.—			
From Germany	61,000	50,000	— 11,000
„ United States ...	64,000	129,000	+ 65,000
„ Great Britain ...	53,000	121,000	+ 68,000
„ Other countries ...	5,000	2,000	— 3,000
Total ...	183,000	302,000	+ 119,000
Iron wire.—			
From Germany	167,000	168,000	+ 1,000
„ United States ...	342,000	338,000	— 4,000
„ Great Britain ...	27,000	25,000	— 2,000
„ Other countries ...	13,000	5,000	— 8,000
Total ...	549,000	536,000	— 13,000
Rails.—			
From Germany	403,000	335,000	— 68,000
„ Belgium	101,000	98,000	— 3,000
„ United States ...	4,340,000	3,148,000	— 1,192,000
„ Great Britain ...	780,000	355,000	— 425,000
„ Other countries ...	23,000	8,000	— 15,000
Total ...	5,647,000	3,944,000	— 1,703,000
Insulators of glass or porcelain.—			
From Germany	28,000	17,000	— 11,000
„ Austria	5,000	3,000	— 2,000
„ United States ...	95,000	84,000	— 11,000
„ Other countries ...	1,000	1,000	—
Total ...	129,000	105,000	— 24,000
Commutators, interrupters, contacts, safety cut-outs, &c.—			
From Germany	77,000	92,000	+ 15,000
„ Austria	5,000	1,000	— 4,000
„ United States ...	191,000	277,000	+ 86,000
„ France	2,000	11,000	+ 9,000
„ Great Britain ...	12,000	4,000	— 8,000
„ Other countries ...	1,000	5,000	+ 4,000
Total ...	288,000	390,000	+ 102,000
Arc lamps.—			
From Germany	20,000	16,000	— 4,000
„ United States ...	32,000	35,000	+ 3,000
„ Other countries ...	1,000	1,000	—
Total ...	53,000	52,000	— 1,000
Incandescent electric lamps.—			
From Germany	275,000	233,000	— 42,000
„ Austria	25,000	26,000	+ 1,000
„ United States ...	360,000	398,000	+ 38,000
„ France	10,000	11,000	+ 1,000
„ Great Britain ...	26,000	2,000	— 24,000
„ Switzerland ...	8,000	1,000	— 7,000
„ Other countries ...	—	11,000	+ 11,000
Total ...	704,000	682,000	— 22,000
Machines for industries, mining, &c.—			
From Germany	2,116,000	2,955,000	+ 839,000
„ Austria	6,000	6,000	—
„ Belgium	70,000	139,000	+ 69,000
„ Canada	—	5,000	+ 5,000
„ Spain	32,000	43,000	+ 11,000
„ United States ...	13,352,000	16,661,000	+ 3,309,000
„ France	371,000	394,000	+ 23,000
„ Great Britain ...	2,891,000	3,158,000	+ 267,000
„ Italy	17,000	46,000	+ 29,000
„ Sweden	91,000	219,000	+ 128,000
„ Switzerland ...	159,000	125,000	— 34,000
„ Other countries ...	31,000	18,000	— 13,000
Total ...	19,136,000	23,769,000	+ 4,633,000
Carriages of all kinds for railways, &c.—			
From Germany	40,000	94,000	+ 54,000
„ United States ...	1,747,000	4,048,000	+ 2,301,000
„ France	—	5,000	+ 5,000
„ Great Britain ...	119,000	10,000	— 109,000
„ Other countries ...	1,000	2,000	+ 1,000
Total ...	1,907,000	4,159,000	+ 2,252,000
Asbestos sheets, &c.—			
From Germany	6,000	2,000	— 4,000
„ United States ...	106,000	123,000	+ 17,000
„ France	1,000	4,000	+ 3,000
„ Great Britain ...	3,000	—	— 3,000
„ Other countries ...	1,000	1,000	—
Total ...	117,000	130,000	+ 13,000
Scientific instruments and apparatus.—			
From Germany	94,000	114,000	+ 20,000
„ United States ...	199,000	218,000	+ 19,000
„ France	82,000	74,000	— 8,000
„ Great Britain ...	11,000	13,000	+ 2,000
„ Italy	15,000	29,000	+ 14,000
„ Other countries ...	9,000	8,000	— 1,000
Total ...	410,000	456,000	+ 46,000

ACZOL: A NEW PRESERVATIVE MATERIAL FOR TIMBER.

BY WM. MANKTELOW.

THE conservation of the world's timber supply is a matter of vital importance, for, by no means, can the growth of good wood be appreciably expedited; and, meanwhile, the consumption of timber for every purpose—from the support of transmission lines to the manufacture of paper pulp—increases by leaps and bounds. Lumber has to be collected from more and more inaccessible areas (a fact which, alone, considerably increases the market cost), and forest fires continue to devastate enormous areas yearly. The problem of timber supply has become really acute, and the most obvious solutions—the practice of systematic reafforestation and the prevention of premature decay of timber used in outdoor, mining and similar services—are now receiving more or less effective application.

In a recent article in these columns (ELECTRICAL REVIEW, February 2nd, 1912, page 193, *et seq.*) the author dealt with various methods of pole preservation, the period of efficacy of which is limited by the antiseptic properties of the preservative and by the time which elapses before the latter is largely washed out (in the case of metallic salts and other materials soluble in water), or evaporated (in the case of creosote and the allied oils).

No metallic salt or salts which will not form an insoluble (in water) compound with cellulose can be of any lasting value in timber preservation, and, in any case, it is specially desirable that the salts should not cause or favour the corrosion of iron and steel. Creosote has hitherto proved the most generally useful preservative, but the treatment required is costly, and the wood is left in a more or less objectionable state, besides being very materially increased in weight by the process (a matter of some importance where transit over long or difficult routes is con-

cerned). Besides the gradual "settling" of creosote towards the foot of the pole, and eventually, more or less, completely out of the latter, the phenols and naphthaline in the oil evaporate more quickly the higher the atmospheric temperature, and the antiseptic properties of the remaining constituents are comparatively low.

A new preservative material, which obviates the defects of older preparations, has lately been brought forward under the name of "Aczol." This is a patent compound of metallic ammoniates with an antiseptic acid having no deleterious action on wood or metals. The chemical properties and preservative action of the new material are as follows :—

On Cellulose.—Copper ammoniate, which is one of the constituents of Aczol, possesses the well-known property of dissolving cellulose and thereby enabling the capillary attraction of the whole of the preservative compound into the innermost pores. By evaporation of the alkali, the walls of the cells receive a stable, preservative coating which fixes the nitrogenous matter in the fibres, and forms small quantities of metallic sulphates and phosphates, which repel insect and fungus attack.

On Paracellulose (which is not soluble in copper ammoniate until it has been acted upon by acids or alkalis), the presence of the antiseptic acid enables a similar action to the above—a point which is of special importance in the preservation of poplar, fir and oak—the ligneous tissues of which contain more paracellulose than cellulose.

Albumenoidal matter, between and within the cellular cavities, is never eliminated, particularly from the sapwood, however careful the drying. The zinc ammoniate in Aczol coagulates and mineralises this nitrogenous matter.

Vasculose forms the chief part of the wood vessels in plants, and is insoluble in concentrated acid and in copper ammoniate, but is converted, by the joint action of an organic acid in presence of copper and zinc ammoniates, to resin soluble in ammonia. As the latter evaporates, the resin is deposited as a laquer on the fibres. This action enables the deep penetration of the preservative acid and ammoniated cellulose during the treatment, and ensures their subsequent diffused retention. According to Fremy and Urbain, the woody fibres of poplar and oak contain 18 per cent. and 28 per cent. respectively of vasculose.

Comparisons Between Aczol and Other Timber Preservatives.—The results summarised in Table I, of tests carried out by the authorities stated, are reproduced from reports published in an article on Aczol in the *Revue de l'Ingenieur*. The method of conducting the various tests is outlined below, and from the results obtained, it will be seen that Aczol offers very considerable advantages over copper sulphate (Boucherie) treatment. It is only fair to remark that the superiority of Aczol to creosote, as regards preservative value, is not clearly demonstrated, though its advantages as regards lightness, strength, cleanliness and non-inflammability of the treated wood are obvious. It would seem, however, that in *permanence* of effect, Aczol is superior.

In Test 1, wood treated by various processes was reduced to sawdust and macerated with distilled water saturated with carbonic acid and carbonates ; the percentage solution of Aczol was negligible, whereas the demetallisation of the samples treated by other processes was very serious. In Test 2, treated specimens were maintained at 30° C. for 48 hours in damp soil charged with a 2 per cent. solution of inverted sugar to which yeast was added to set up fermentation ; again, the stability of the Aczol compound was demonstrated. The combination of Aczol with cellulose is insoluble in water, so that no Aczol is dissolved from treated timber by from 1 to 6 hours' boiling in water. Since Aczol contains no sulphates, chlorates, nitrates or other oxidising agents, it cannot corrode iron or steel.

The remaining tests were of a more practical nature ; in Test 3, samples of elder, beech, pine, birch, oak and fir were exposed to the rotting action of a mixture of dung and clayey soil during nine months. Those specimens treated with Aczol showed the best preservation—not only as determined by low loss of weight, but also as indicated by the general condition of the wood after the test. Timber props exposed to moist hot air in the return air galleries of two Belgian collieries are found to rot to the limits of safety within 4-7 months if untreated, but props impregnated with Aczol have already been in use from two to three times this period without undergoing appreciable damage.

Owing to the surface solution of the fibres and tissues, which occurs during the impregnation of timber with Aczol, and the subsequent "sealing" or "binding" of these parts one with another, the mechanical strength of the wood is materially increased by the treatment—as is clearly shown by the data in Table I (Tests 4-6).

The double salts of heavy metals and ammonium, contained by Aczol, render the wood uninflammable as long as the salts are not volatilised by the continued application of a high temperature. In this respect, the new preservative is preferable to creosote and its derivatives. It is possible to vary considerably the appearance of wood impregnated with Aczol and to paint or polish it when dry.

As marketed, Aczol is in a highly concentrated form needing dilution in 10-20 volumes of water for use as an impregnant or in 5-10 volumes when used as a paint. Where facilities are not available for vacuum and pressure impregnation, cold immersion gives satisfactory results, though the more elaborate process is, of course, always preferable.

The fluidity of Aczol enables it to be applied cold, whereas creosote and other tar products need heat to reduce their viscosity during injection.

TABLE I.—Condition of Timber.

Test.	Authority.		Plain wood.	Impregnated with— 2 % $CuSO_4$	2 % $CuSO_4$, 3% Amm.	Creosote.	Aczol.
1. % Copper removed	Bergé		...	77	41	...	3½
2. % Copper removed	Bergé		...	81	...	...	4½
3. % Loss wt. of wood	Durieux		38·3	22·6	...	...	9·1
4. Resistance ; compression	State testing dept. Malines	Ult. kg.	530	...	290	574	
		No. tests	4	...	5	4	
5. Ditto ditto		Ult. kg.	390	...	353	573	
		No. tests	4	...	7	7	
6. Resistance ; tearing		Ult. kg.	465	...	...	902	
		No. tests	4	...	...	4	

THE OPTICAL CONVENTION, 1912.

The second Optical Convention met on Wednesday, June 19th, under the presidency of Prof. Silvanus P. Thompson, in the Science Museum at South Kensington. The Southern Galleries, which had been kindly placed at the disposal of the Committee by the Board of Education, were well filled with a representative collection of instruments and processes connected with all branches of optics, exhibited by some of the best known firms of opticians and instrument-makers. The use of the Lecture Theatres of the Imperial College of Science was also granted for the purposes of the Convention.

The inaugural meeting was held at 8 p.m. on Wednesday, June 19th, when the presidential address was delivered. After sketching the progress of optics and kindred sciences from the earliest times to the present day, Prof. Thompson spoke very strongly on the necessity for proper co-operation between the mathematical optician and the actual maker of optical instruments, and advocated the formation of a "monotechnic" for the teaching of optics, where both lens calculation and lens grinding could be taught in one institution, thus ensuring a real co-ordination of the science and technology of optics. Prof. Thompson's remarks on this head could undoubtedly be applied with equal force to many other industries besides that of optics.

Many distinguished men of science were present at the reception and conversazione which followed the presidential address, and keen interest was displayed in the numerous working exhibits, and especially in the historical exhibits, in which the original experiments of Newton and Fresnel were demonstrated. During the five days of the Convention

many valuable papers were read. Among these, that by Dr. Harker, on "Optical Pyrometry," was of great interest, in view of the recent advances in the theory and practice of optical methods of temperature estimation.

EXHIBITS.

Although the great majority of the exhibits were of a purely optical character, a few firms showed some interesting electrical apparatus.

The Cambridge Scientific Instrument Co. had a number of electro-meteorological instruments on view, including the Callendar recorder and open-wound resistance thermometer. This instrument gives a very sensitive and accurate record of a rapidly fluctuating temperature. Records of its performances during thunderstorms and the recent solar eclipse illustrate the instrument's rapidity of action in its quick response to a rapid fall in temperature.

Another application of the Callendar platinum thermometer was shown by the same firm in the bolometric sunshine receiver. The essential part of this instrument consists of two platinum resistances mounted on a mica framework, the whole hermetically sealed up in a glass bulb filled with dry air. One resistance is blackened and the other left bright. They are connected differentially to a Callendar recorder. Atmospheric temperature changes affect both arms equally, but radiant heat is indicated—its absorption by the blackened surface throwing the recorder out of balance. The record indicates not only the duration of sunshine, but also the intensity of the sun's radiation.

The Wilson Universal electrometer was also shown in a portable form, especially suitable for measurements of atmospheric potential.

An improved form of the Thomson galvanometer designed by Paschen for use with his thermopile in radiometry measurements was shown, as well as the thermopile itself. A Fery pyrometer used in conjunction with a thread recorder, and a selection of pyrometers and resistance thermometers, were also on view.

Much of the space on the lower floor of the Museum was taken up by photometric apparatus. As the compilers of the wonderfully complete catalogue remark, "it is probable that before long the public will awake to the fact that it is possible to measure the candle-power of a lamp, or the illumination produced by it." Portable photometers were represented by the Holophane Lumeter and the Everett-Edgcumbe Luxometer, both of which appear to measure "surface brightness" with convenience and accuracy. The ranges of both instruments can be varied to meet any requirements from $\frac{1}{100}$ candle-foot to 2,000 candle-feet. For use with the Lumeter, Messrs. Beck showed a new polar curve apparatus, which affords a convenient method of determining the intensity of light in every direction with rapidity.

Some elegant photometer benches were shown by the Holophane Co., Everett, Edgcumbe & Co., Wm. Sugg and Co., and the Alexander Wright Co. The latter company also exhibited a street photometer with carriage, but we tremble to imagine the panic that would result from its passage down Oxford Street or the Strand. It is claimed for this apparatus that it is accurate, simple and independent of colour difficulty.

Some examples of the Harcourt lamp were also shown by Messrs. Sugg and Messrs. Wright.

Recent progress in illuminating engineering has led to the design of greatly improved forms of globes, shades and reflectors. The exhibition illustrated most of the recent forward steps in the science of illumination. Distributing and concentrating reflectors were shown by the Benjamin Electric Co., and various methods of indirect lighting by reflection on to white surfaces were also shown. The "Excello" flame arc lamp was shown fitted with a dioptric inner globe with a lenticular formation upon its outer surface, which gives greater light emission at high angles. This effect was demonstrated most clearly by photographs, diagrams and polar curves.

An attempt to produce the same effect as is obtained in diffused sunlight was shown in the Benjamin daylight unit. This consists of a special metal reflector equipped with a "Wratten" screen.

Among the scientific specialities of the Holophane Co., perhaps the most striking was the "Uniflux" reflector, designed to give a uniform illumination over a plane surface with the aid of sources placed near one or more edges of the area illuminated, *e.g.*, pictures, maps, &c.

Three cases provided by Siemens Bros. served to illustrate the process of manufacture of "Tantalum" lamps, the different types of lamp bulbs and the characteristic curves of these lamps, with various reflectors.

The automatic feed arc lamp for optical lanterns, as exhibited by one or two of the firms, will probably serve to make many lectures run smoothly that have hitherto been marred by sudden and ill-timed lantern failures. The "Westminster" arc lamp, in which the carbons are at right angles, was also shown, and appears to have many advantages, especially in the matter of steadiness, over the existing open type of arc.

THE APPLICATION OF ELECTRICITY TO RAILWAY CAB SIGNALLING.

BY WILLIAM H. DAMMOND.

EVERY existing railway block signalling system is an electrical system. Even in those instances in which the signalling devices themselves are purely non-electrical, a signalman must never mechanically move any one of his block signals to the "clear" indication until he first electrically asks permission to do so and then electrically receives such permission.

Despite the serious faults incident to the development of cab signalling—faults which cannot intelligently be urged against the cab signal idea, but which can rightly weigh only against the particular inventions in which they occur—such development has, in an important particular, proceeded in the right direction; so that, practically, cab signals may now be considered as belonging exclusively to the class in which the signalling devices themselves are electrically operated, in contradistinction to the class in which such devices are mechanically operated. Automatic stops are identical as to ultimate aim with cab signals, and are used to a considerable extent in the United

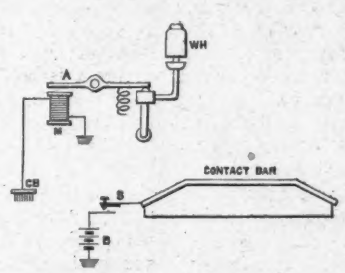


FIG. 1.

States and England. In both countries, however, the automatic stops are decidedly inferior to the best cab signals now in regular service in England. These automatic stops contain none of the electrical safeguards, met with in cab signals, against the dangerous consequences of failure by impact.

Fig. 1 shows a simplified diagram of a cab signal that has been in use for several years on about 2,000 miles of track in France. Here the locomotive equipment consists essentially of a danger whistle W H, a whistle armature A, an electromagnet M, and a collector brush C B, the magnet being grounded on one side on the locomotive frame, and connected on the other side to the collecting brush. At each point along the track at which it is desired to give cab-signal information, is located an insulated contact bar, which is connected, through a switch S, to one side of a battery B, the other side of B being grounded on the track rails. This signal, like that shown in fig. 2, is used merely as a supplement to manually-operated fixed block signals, and in both cases switch S is operated by the fixed signal lever. In fig. 1 the arrangement is such that switch S is closed when

the signal lever is at "danger," and is open when the signal lever is at "clear."

In fig. 1 the whistle valve is held closed by a spring except when armature A, which controls this valve, is attracted by whistle magnet M. So long, then, as the collector brush is not in communication with the contact bar the whistle remains mute. When the signalman throws the fixed signal to "clear," the contact bar becomes disconnected from its battery B, so that brush C B, if it then passes over the contact bar, receives no current from the latter. Whistle W H, therefore, remains silent. When, *per contra*, the signalman sends his lever to "danger," switch S is thereby closed, causing a partial circuit to extend from B to the contact bar; so that if the train proceeds until collector brush C B touches the contact bar, this partial circuit is completed through M. Magnet M then attracts armature A, causing the whistle valve to open, and whistle W H to give

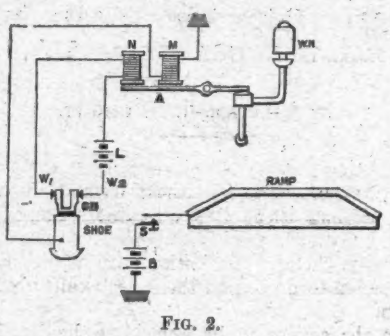


Fig. 2.

an audible danger indication. This system cannot be too strongly condemned. It violates the most important principle of electrical block signalling. If battery B should become either exhausted or short-circuited; or if C B should be prevented, by dirt or ice, for instance, from making sufficiently good contact with the contact bar; or if a single wire should become broken, the cab signal would continue to indicate "clear" (by remaining silent), no matter if the real condition ahead were "danger."

Fig. 2 shows, in simplified form, a cab signal used extensively at present in England. It is free from the objections just mentioned as to fig. 1. This superiority may be considered as arising from the fact that in fig. 2 the whistle valve is held closed only when armature A is held up by one or the other of the two electromagnets M and N. In addition to these parts, the locomotive equipment in fig. 2 includes a battery L, a shoe, and in mechanical connection with the shoe, a circuit-breaker. On the track a ramp is provided, between the track rails, at each cab-signalling point.

Between ramps the whistle W H, fig. 2, is held mute by magnet N, the circuit here being fed by locomotive battery L. Whenever the locomotive arrives at a signalling point, the shoe is raised by engagement with the ramp, causing the circuit-breaker C B to leave this circuit open between wires W_1 and W_2. Thus far, then, the whistle valve would open, by gravity, and the whistle blow every time the locomotive encountered a ramp. But when the signalman throws his fixed signal lever to "clear," switch S (fig. 2) is thereby closed, electrically connecting up the ramp with battery B. Current from B will then be conducted (through the ramp and the shoe) to magnet M, and the latter (by attracting A) will hold the whistle mute. If, therefore, the fixed signal is at "clear," the cab signal will remain silent while the locomotive passes over the ramp; but if the signalman sends the fixed signal to "danger," the cab signal will audibly indicate "danger" when the shoe encounters the ramp.

The shoe of fig. 2 is subject to very violent impact at high train speeds. Obviously, if the bottom part of this shoe should become broken by impact with a ramp or with a foreign body on the track, the cab signal would fail to indicate "danger" at the next signalling point, even though the track ahead were obstructed. It has been suggested that the false clear indication, in this case, should be provided against by making the fastening of the shoe supports to the locomotive sufficiently weak to ensure that breakage would occur there, since such breaking would effect the opening of the circuit at the circuit-breaker. But this would be extremely bad designing, since it would be dangerous to have such a heavy and large mass of iron drop under a locomotive running at high speed, for the danger of breaking, in the case of a shoe, varies directly as the square of the train speed.

While the stipulation that all errors at all likely to occur should be "on the side of safety" is the most important, it is certainly not the only important consideration. Even the false danger indication, which is the safe error, must be the rare exception under ordinary—that is, very trying—conditions. In order that the signal in fig. 2 shall not violate this second important rule, it is necessary to have heavy shoe pressures, so as to ensure good contact on dirty, rusty, or icy ramps. But this increment to pressure increases impact, thus rendering all the more likely the occurrence of the most serious consequences.

Another cab system has been proposed, as both a cab signal and an automatic stop, in which the shoe of fig. 2 is replaced by a ramp-engaging wheel, which is driven from the axle of a wheel that runs on one of the track rails. The rotation, at the instant of striking the ramp, of the ramp-engaging wheel produces an enormous reduction of impact. But a discussion of this interesting and important mechanical improvement cannot be attempted here; so that we must proceed at once to the only proper arrangement that has as yet appeared at this point in cab systems.

This arrangement is the wheel E, shown in fig. 3. This wheel is set in rotation by impact with a ramp, but ceases to rotate soon after leaving the ramp. Such a member accomplishes a great reduction in that component of the total impact which is expended in rotation, and which is by far the greater of the two components arising at the ramp. Assume, for simplicity, that this wheel is a simple circular lamina. The radius of gyration, then, equals the radius divided by $\sqrt{2}$, while the moment of inertia is equal to $\pi/2$ times the fourth power of the radius. From this it follows that the impact speed for rotation is half as great as the train speed, and that the destructive tendency due to rotation is only one-fourth of what the corresponding component would be for a shoe. This reduction, together with

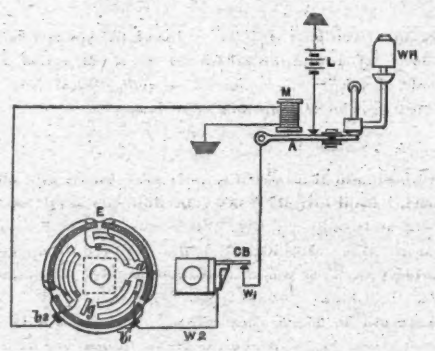


Fig. 3.

the electrical features of fig. 3, leaves this system practically free from any impact danger. In fact, this arrangement corrects all the faults mentioned in connection with the other systems.

Although fig. 3 is the diagram of a locomotive equipped with a single audible signal only, the system of which it shows a part has been so developed as to afford distinctive home and distant cab signals, both visual and audible; it can also be used as an automatic stop. In the diagram, the axle box (to which the circuit-breaker C B is attached) of the insulated wheel is put out of its proper position, in order to show the locomotive circuit clearly. The correct location of this axle box is indicated broken lined at the wheel. The whistle valve is held open by gravity; so that the whistle W H blows except when armature A, which controls the whistle valve, is attracted by signal magnet M. The division of the rim of the wheel into insulated segments, as shown, renders it impossible to complete the circuit (between the brushes b_1 and b_2) from locomotive battery L to magnet M except through the lower arc of the circumference of the wheel, which is the part depended upon for engaging ramps.

When the wheel rotates so as to cause at the rim an open circuit between the brushes b_1 and b_2, the insulated contact pieces d, fastened to the wheel and rubbed by the stationary bridging piece g, close the circuit between the brushes without in any manner impairing this element of safety.

On encountering a ramp, the insulated wheel is raised, carrying the axle box and circuit-breaker with it. This opens the circuit here shown between wires w_1 and w_2. If, however, the ramp is connected to one side of a battery (not shown), the other side of which is grounded on the track rails, current from the battery will energise M, thus causing A to continue attracted. When, therefore, the insulated wheel is raised by a ramp to which current is not supplied from the track, the audible danger signal will be given; while the whistle will remain silent whenever the insulated wheel rides over a ramp to which such current is supplied.

As regards the control of the ramp current, this system exists in a manual and an automatic form. In the manual form it closely resembles, at this point, the system illustrated by fig. 2; while in the automatic it differs but little here from the corresponding part of an automatic fixed signal. Contrary to opinion widely held in England, an "all-electric" automatic fixed block system is cheaper both as to first cost and as to subsequent costs (operation, maintenance and depreciation combined), than a system of fixed mechanical block signals. This same difference in favour of the automatic form holds in the case of the cab system illustrated by fig. 3. This is the only cab system yet proposed which is capable of giving complete protection without the aid of any form of fixed block signals.

A METHOD OF DETERMINING THE DISTANCE OF A PARTIAL DISCONNECTION IN A SUBMARINE CABLE.

By CHAS. E. HAY.

To localise the position of a so-called partial disconnection unaccompanied by an earth fault in a cable is a matter of some difficulty, especially when the resistance of the fault is varying. The term partial disconnection is generally understood to mean that at a certain point of the cable the resistance of the conductor has increased abnormally, but is not infinite. The method described herein was designed to meet this particular case, and was successfully applied to

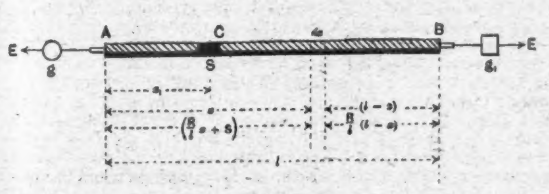


Fig. 1.

localise a fault of this character, which had proved peculiarly elusive, owing to the extraordinary way in which its resistance was varying. It is also applicable when the resistance of the fault is very small or indefinitely great, as will be seen.

Fig. 1 is a theoretical representation of the full diagram of the necessary apparatus shown in fig. 3.

At the distant end a good core of the cable is looped with the faulty core, which, in fig. 1, is represented by A—B as one straight length.

l = length of A—B.
x_1 = distance of the fault.
S = resistance of the fault.
R = resistance of A—B.
g = resistance of galvanometer.
g_1 = a resistance equal to resistance of galvanometer.

First, consider the section C—B, and let the charge on unit length of the cable equal q. On an element dx, at a

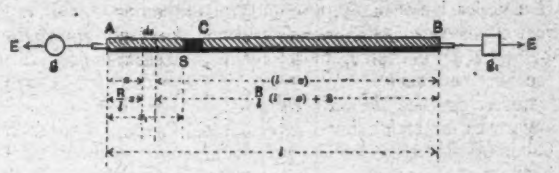


Fig. 2.

distance x from A, the charge is $q \cdot dx$. Of this quantity, a part flows out at B equal to—

$$\int_{x_1}^{l} \frac{(R\,x/l + S + g)}{R + S + 2g}\, q \cdot dx$$

$$= \frac{q}{R + S + 2g} \int_{x_1}^{l} (R\,x/l + S + g)\, dx. \quad (1)$$

Second, consider the section A—C, fig. 2. The quantity on the element dx is $q \cdot dx$, and of this quantity a part flows out at B equal to—

$$\int_{0}^{x_1} \frac{R\,x/l + g}{R + S + 2g} q \cdot dx$$

$$= \frac{q}{R + S + 2g} \int_{0}^{x_1} (R\,x/l + g)\, dx. \quad (2)$$

Therefore, the total quantity flowing out at B when both cores are put to earth at the same instant, is—

$$\frac{q}{R+S+2g}\left[\int_{x_1}^{l} (R\,x/l + S + g)\, dx + \int_{0}^{x_1} (R\,x/l + g)\, dx\right] \quad (3)$$

$$= \frac{q}{R + S + 2g} [\tfrac{1}{2} R\,l - x_1 S + l(S + g)].$$

Let $x_1 = n\,l$

$$= \frac{q\,l}{R + S + 2g} [\tfrac{1}{2} R - S(n - 1) + g]$$

$$= \frac{Q}{R + S + 2g} [\tfrac{1}{2} R - S(n - 1) + g], \quad (4)$$

where Q is the total charge on the looped cores.

From (4)

$$n = \frac{(R + 2g)(\tfrac{1}{2} Q - D) + S(Q - D).}{Q\,S}, \quad (5)$$

where D is the total quantity flowing out at B as measured on the galvanometer joined up as shown in fig. 3.

Also from (4), if $S = 0$,

$$D = \tfrac{1}{2} Q,$$

and if $S = \infty$,

$$D = Q(1 - n)$$
$$= Q(1 - x_1/l),$$

which are obviously correct.

It will also be seen from equation (5) that if $(R + 2g)$ is small compared with S, the value of S need not be very

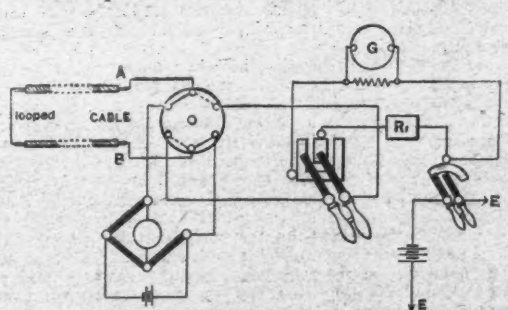


Fig. 3

accurately determined, which is a very great advantage when S is varying continuously. For this reason, it is advantageous to keep the resistance of the galvanometer as low as possible, which can always be effected by means of a suitable shunt.

For example, suppose $(R + 2g) = 500$, $Q = 200$, $D = 150$, and S is varying between 10,000 and 100,000 ohms, the total variation in x_1, as calculated, will only be 5 per cent. If S varies between 10,000 and 20,000 ohms, x_1 will only vary 2 per cent. As the resistance of the fault approaches $(R + 2g)$ in value, more accurate measurements of S become necessary. A switch is provided for rapidly transferring the looped cores from the bridge to the apparatus for measuring the discharge, fig. 3. A reversing key is also inserted for the purpose of enabling the quantity flowing out at A, as well as at B, to be measured. If the sum of these two quantities equals Q, it may be safely concluded that the resistance of the fault has not altered during the test. The resistance R_1, which corresponds to g_1 in the theoretical diagrams, is made equal to the combined resistance of the galvanometer and its shunt, and is inserted in the other core, so that in case the resistance of the fault falls to zero during the test, the fact is indicated by the quantities flowing out at A and B being equal.

PROCEEDINGS OF INSTITUTIONS.

Power Generation and Distribution in the Clyde Valley.

By DAVID A. STARR, M.I.E.E.

(*Abstract of paper read before the* INSTITUTION OF ELECTRICAL ENGINEERS, *at Glasgow, May 15th*, 1912.)

IN August, 1901, royal assent was given to the Clyde Valley Electrical Power Act (1901). Besides the general powers conferred, authority was given to construct three generating stations, and to lay cables and distribute power in the counties of Lanark, Renfrew, Dumbarton and Stirling, an area of 750 sq. miles in all, excluding the city of Glasgow, the burghs of Partick, Govan and Paisley, and other burghs within the boundaries of the company's area, where local plants were already established or provisional orders had been granted.

The system of generation and distribution decided upon was three-phase alternating current at a pressure of 10,000 to 11,000 volts between phases, and a periodicity of 25 cycles per second.

It was decided to erect two power stations—one at Yoker, on the Clyde, opposite Renfrew, and the other near Motherwell. The contractors were the British Westinghouse Electrical and Manufacturing Co., Ltd. Construction work was commenced on the buildings during 1902, and in August, 1905, the Yoker power house and generating plant was handed over to the company. In December of the same year the Motherwell power house was completed and taken over, as were also a certain amount of main cables and several sub-stations. The power-house buildings were very similar in design, and the plants identical in each, excepting the system of condensing.

At the time the plant was handed over to the company the following had been installed in each power house* :—Four Babcock and Wilcox water-tube boilers, land type, each having a guaranteed evaporation of 16,000 lb. per hour, with superheaters and economisers, and Roney (American) stokers.

Two turbo-generators with condensing plant were installed in each power-house; these had a nominal capacity of 2,000 KW. each.

The turbines are of the Westinghouse-Parsons double-flow type direct connected to generators of a similar capacity, generating 10,000 to 11,000 volts, three-phase, 25-period current. The main and selector E.H.T. switches, as well as some of the auxiliaries, such as coal conveyors and hot-well pumps, were formerly operated by current from the exciters, which were direct-connected to independent steam engines of Westinghouse compound type with Worthington condensers. At Yoker surface condensers were used, whilst at Motherwell the condensing was done on the barometric jet principle.

Several additions and alterations have been made to the general equipment to meet the increased demands for supply, and to accomplish more economical and efficient operation. It was discovered that the Roney stokers were unsuited for Scotch coal, and they were replaced by chain-grate stokers. The steam engines driving the Roney stokers were scrapped, and electric motors were substituted. The change has been justified by the large saving which afterwards took place in the coal consumption. At Yoker the steam-driven circulating pumps were replaced by motor-driven pumps placed in the well at the river instead of at the head of the pipe line next the condensers. This work soon justified itself by a further reduction in the fuel consumption. It was also found, owing to the fluctuating load and the small amount of power which was used during the night and over week-ends, that it would be advisable to install a smaller generating unit in each power house to handle these small loads. Accordingly a turbo-generator of 600 KW. capacity was installed at Yoker, and one of 1,000 KW. at Motherwell. Next, it was found that the day load was increasing beyond the capacity of any one of the generators, and having realised in practical operation that the turbines were of a much greater capacity than their nominal rating, it was decided to increase the capacity of the generators in proportion. The British Westinghouse Co. undertook to rewind the generators on site and increase their output by 50 per cent., and this work was satisfactorily carried out. Additional by-pass valves were placed on the turbines, and the whole work was carried out without any interruption to supply. This gave at the beginning of the year 1910 a generating plant capacity in Yoker of 6,600 KW. and 7,000 KW. at Motherwell. Four additional boilers of a similar size to those first installed had been erected in Motherwell and also a second cooling tower. At this period the maximum load on feeders at Yoker was 2,500 KW. and at Motherwell 4,500 KW. The total connections of consumers' plant to mains aggregated 26,000 H.P.

At the end of 1909 a new line of underground cable was laid between Rutherglen and Renfrew, which connected the Yoker and Motherwell networks together. This immediately effected a decided saving, as during periods of light load the supply could be given from either one or other of the power houses. It also had other advantages, as current could be transferred from one area to another when and as required, and the loads could be so adjusted as to keep the plants in both power houses running at their best efficiency.

Early in 1910 it became necessary to increase the generating plant at Motherwell, and an order was placed with the British Westinghouse Electric and Manufacturing Co., Ltd., for a 5,000-KW. turbo-generator of the Rateau type, the manufacturers agreeing to take in part payment the 1,000-KW. turbo-generator, as there was now no necessity for the smaller unit. This 5,000-KW. set was put in commission at the end of the year. On test the steam consumption indicated on the average day's load at least 25 per cent. less than the consumption of the turbines originally installed. The turbine was constructed on the Rateau system, with a Curtis ring for the high-pressure impulse end. The generator embodied all the latest improvements in modern power plant design. The field is energised from an exciter directly coupled on the end of the main shaft. The windings are kept cool by means of an external electrically driven fan. A series of exhaustive tests were taken on site, with the following results, which are corrected to 175 lb. steam pressure, 150° F. superheat, and 28½-in. vacuum :—

Per cent. load	125	100	75	50	25
Steam consumption :—					
(Lb. per KW.-hour)					
Guaranteed	15·00	15·00	15·2	17·5	21·6
Actual	13·45	13·35	13·6	14·5	17·8

Two new boilers were installed of the Babcock & Wilcox water-tube type, but of larger capacity than those originally installed, each giving an evaporation of 33,000 lb. of steam per hour. A steel stack was erected common to both boilers, also an exhaust-draught system with motor-driven fan, taking not more than 30 B.H.P.

These boilers, as well as two similar additional sets, were placed in a building directly opposite the first set of boilers, and in a position where the same bunkers and conveyors could serve the new units. This also brought the boilers nearer to the turbines, and effected quite a large saving in the original estimate for boiler extensions.

The condensing system, due to the poor vacuum obtainable with long lengths of exhaust piping, and the high temperature of water from the cooling towers, next received very careful consideration by the engineers and management, and it was decided to install a system of surface condensing for the new plant, with a pipe line of sufficient capacity for four 5,000-KW. sets or their equivalent. The condenser is of the Weir Uniflux type, having a capacity of 80,000 lb. of steam per hour with 7,000 gallons of water per minute and a cooling surface of 6,000 sq. ft. The air-pump in the power house is of the Weir dual motor-driven type, and two pumping units have been placed in the pump house at the river, each consisting of an Allen rotary circulating pump direct coupled to a three-phase 400-volt 25-period motor, having a nominal output of 350 H.P., but with a guaranteed overload of 100 per cent. for six hours. It was found that 650 H.P. was required to drive each of these pumps and supply sufficient water for the condenser, and advantage is taken of the difference in levels to obtain a certain amount of power from the head of return water. A water turbine is direct coupled to the other end of the pump shaft, and the main motor, circulating pump and water turbine are erected on a common bed-plate. The pipe line is first filled by the motor on its overload, and as soon as there is sufficient head in the return pipe, the valves of the water turbine are opened gradually, when the full volume of return water is flowing. A saving of over 40 per cent. is effected in the power required to operate the circulating pumps. In practice, it has been found quite practicable to operate the condensers for two turbo-generators of 5,000 KW. each at or near full load, with one of these pumping sets. The results actually obtained with the new turbo-generator and the pumping and condensing plant have shown a saving of 30 per cent. in the fuel consumption at the Motherwell power house. The air-pump at the power house, which is motor driven, takes only 12½ H.P. when the turbine is running full or on overload, and no trouble is experienced in maintaining a vacuum of from 96 to 96½ per cent. of the barometer.

The first 5,000-KW. set with the condensing plant was put on commercial load in January, 1911. As the demands on the power house were still increasing, a second 5,000-KW. set, with similar condensing plant and to the same specification, was ordered and installed before the end of 1911.

At Yoker a new 5,000-KW. set is now being installed, the good results obtained from the operation of the Motherwell plant having decided the company to install similar generators and condensing

* These stations were fully described in the ELECTRICAL REVIEW of June 23rd, 1905.

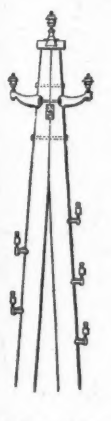
plant there. The installation of a 10,000-KW. unit is now being considered for the next extension to the Motherwell power house. In a short time the available generating plant will consist of the following :—Motherwell, four units ; two of 5,000 KW. and two of 3,000 KW. ; total, 16,000 KW. The two smaller machines are kept as reserves in case of an accident to either of the other two sets. At Yoker there will be three units ; one of 5,000 KW. and two of 3,000 KW. ; total, 11,000 KW. For the present the two 3,000-KW. sets will be kept as a reserve for the 5,000-KW. set.

The boiler capacity at present at Yoker is six boilers, each having an evaporation of 16,000 lb. per hour, and at Motherwell eight boilers, each having an evaporation of 16,000, and two having an evaporation of 33,000 lb.

The exciters of the first generators that were installed were driven by independent steam engines ; the steam consumption of those sets was very large, and a great deal of fuel was being consumed to keep them running. A storage battery has now been installed in each power house and a motor-driven exciter. These take the place of the steam-driven sets, which are only kept in case of accident. Each battery consists of 60 Tudor accumulator cells of 400 ampere-hours' capacity, connected in series with a reversible booster.

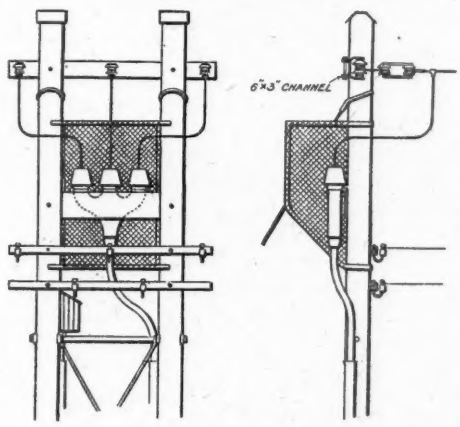
At the present time there are upwards of 96 route miles of underground cable and 21 miles of overhead lines, all operating at 11,000 volts, with 84 sub-stations and six switch houses. All the E.H.T. distribution is at a frequency of 25 cycles, and almost all the low-tension distribution is at the same frequency, the only exception being the Burgh of Clydebank, where lighting and small powers are distributed at 50 cycles.

The main E.H.T. network is laid out on the ring-main system. The longest ring is upwards of 30 miles in route length. The main cables in the neighbourhood of the power stations are lead-covered and are drawn into four or eight-way stoneware conduits, so that spare ducts are available for future extensions. On other sections further removed from the generating stations the cables are laid in earthenware troughs. Stamped steel bridge-pieces hold the cable in position in the trough, the trough being then filled up with bitumen, and the whole protected with a hard-burnt tile 2 in. thick. This method of laying, while it probably gives the greatest security from electrolysis or acids, was found to involve rather too much capital outlay, particularly in outlying districts. During the past two years armoured cable laid direct in the ground has been used with success and economy ; 11,000-volt street-disconnecting boxes are employed in cases of smaller power supplies, where the



STANDARD A POLE

FIG. 1.



STANDARD TERMINAL POLE

FIG. 2.

revenue to be derived from the load is not sufficient to justify the expense of looping in the main ring cables or the cost of erecting a switch house. These boxes are of special design, the distinctive feature being that each phase is brought into a separate porcelain cell to permit of the disconnecting link being oil-immersed. Some of these have been in use for four years, and have given satisfactory service. The company also have a considerable amount of extra-high-tension overhead transmission in sparsely-populated districts. These serve a very useful purpose in development work ; isolated works are thus secured as customers which otherwise would have to be passed over on account of the revenue not being sufficient to meet the heavy cost of underground mains. On some lines the trouble experienced from birds was of a most serious nature ; it was confined principally to terminal poles or poles where shackle insulators are used, and the difficulties were finally surmounted by placing three shackle insulators tandemwise.

The general design of pole is as shown in fig. 1, which represents a creosoted A pole having malleable cast bracket arms. The main conductors are set 30 in. apart, with the telephone and relay conductors carried underneath. The insulators are of the two-part design. Single-part insulators were tried, but had to be discarded on account of unequal expansion and contraction during hot weather.

Where it was necessary to cross highways with E.H.T. lines a pole was erected on each side of the road, and the wires were protected by an earthed cage in accordance with the model description of the Board of Trade then in force. Although these cages were of ample size, and made of the strongest possible material, much trouble was experienced during heavy wind-storms by the cages swinging and making contact with the conductors. Within the last year, however, the Board of Trade have been induced to alter their specification, and now a double conductor is strung across the highways on separate insulators close together, and the two conductors are firmly clamped together at intervals of about 3 to 4 ft., so that in the event of a conductor breaking the strain is taken up by the remaining one. This system of road-crossing has now been adopted by the company, and the cages are being gradually replaced.

The protective system used is that generally known as the Merz-Price balanced protective gear. The pilot wires required for these are laid alongside the main cables in the case of underground work, whilst for overhead work they are carried as separate conductors on the pole line. The relays used are adjusted to operate on a fault current of 60 amperes, and by this means an ample margin of safety is left to allow of one or two branches being tapped off each protected section. Originally each section of overhead line was provided with lightning arresters at points where the overhead line joined underground cables. It was found, however, that these arresters disturbed the balanced protective gear whenever the atmosphere became electrically charged. Trouble from this source became so acute that it was decided to discard the use of these and depend entirely upon the lightning arresters installed on the sub-station bus-bars. Although there have been many severe thunderstorms since this change was made, there has been complete immunity from accident or interruption. The sub-station equipments as now installed are the result of a gradual process of evolution. All the original sub-stations had four single-phase transforming units, one of these being kept as a spare. Gradually three-phase transformers were used, and latterly when it was found from experience that these were absolutely dependable even under the most severe conditions, their installation has become standard practice. All the transformers are oil-cooled, and are wound for operating on primary 10,000 to 11,000-volt circuits mesh-connected and with tappings so arranged as to give a pressure of 400 to 440 volts on the star-connected secondary side. The star-point is brought out and connected to the neutral of the four-core low-tension distribution cables. Lighting circuits are connected between phase and neutral. As a general rule current is supplied at 25 cycles 400 volts three-phase. In some cases, however, special conditions have had to be met and current furnished at a different voltage to meet these conditions.

At the beginning of 1908, 12,400 H.P. was connected to the mains, and the following shows subsequent development :—

January,	1909	...	...	...	19,500 H.P. connected.
"	1910	...	...	...	27,000 " "
"	1911	...	...	...	36,600 " "
"	1912	...	...	...	46,500 " "

On May 1st, 1912, this had been increased by some 6,000 H.P The 46,500 H.P. which was connected to the company's mains at the beginning of this year consisted of 43,500 H.P. in motors, &c., and the equivalent of 3,000 H.P. in lighting. About 2,200 H.P. of the latter represents shop and domestic lighting and heating (exclusive of lighting connected with bulk supply), and the remaining 800 H.P. represents lighting used in works where power is supplied. It will be observed that with such a small proportion of lighting (less than 8 per cent. of the whole load) the company have no appreciable lighting peak at any time during the year.

The diversity factor is also noteworthy. The highest peak reached by the combined stations during 1911 was 12,500 KW., this being only 27 per cent. of the kilowatts connected at that time. The sum of the highest observed loads on the stations taken separately each week is invariably much higher than the actual demand of the two stations when running in parallel. This difference has at times exceeded 1,000 KW. One reason for this is the different class of works being supplied from each power house, and the different hours of working, stoppages for meals, &c., between the districts. At Yoker the supply is largely to shipyards and engineering works, whereas at Motherwell iron and steel works and collieries are the largest consumers. The night load at Motherwell is, as a rule, not less than 20 per cent. below the day load, and the week-end load is never below ½ of the ordinary day load. The load factor on units generated at Motherwell is frequently 65 per cent. and over during a complete week of 168 hours, whilst at Yoker the load factor on similar conditions is frequently 40 per cent. The combined load factor of the two stations sometimes reaches 58 per cent. over a week. At the beginning of 1906 the coal consumption at Yoker was 35 lb., and at Motherwell 49 lb., per unit generated. In the beginning of the year 1907 there was a maximum demand on Yoker of 480 KW., and at Motherwell of 570, and even with a 40 per cent. load factor over the week the coal consumption was between 10 and 11 lb. per unit. At the beginning of this year the coal consumption per unit generated was under 3 lb. per KW.-hour for both power houses, and it is confidently expected that a further reduction will take place when the new Yoker plant is in regular commission, and the full benefit is being derived from the installation of the storage batteries and the closing down of the reciprocating engines already referred to.

The company appears to have good prospects for the future.

One of the company's largest bulk consumers is the Coatbridge and Airdrie Electric Supply Co., Ltd. Previously to 1908 they generated their own current by steam, and during the past six years their output has increased by 700 per cent., their revenue shows an increase of nearly 300 per cent., and gross profits have increased 100 per cent.

During the recent strike amongst the coal miners the company were enabled to maintain their supply to all their consumers until the strike was settled without having to purchase any additional

fuel, having carried a large reserve of coal for some years in case of such a contingency. In many cases considerable additional load was connected to the company's mains, and many works were enabled to keep in full operation that otherwise would have been completely shut down. The good effects of this have already been shown by the increased demands on the company for connection.

DISCUSSION.

MR. M'WHIRTER (Glasgow) complimented Mr. Starr on the condensing plant at the Motherwell power station, and on the load factor he had got; they had also to congratulate Mr. Starr on the means he had taken to prevent a stoppage in case of a coal strike.

MR. W. W. LACKIE (Glasgow) said the Clyde Valley Co. had performed a signal service to the whole electrical industry by showing that electrical energy taken from a large central power house was a thoroughly economical and efficient prime mover. As to coal consumption, they in Glasgow, in the early days, never managed to burn 35 to 49 lb. of coal per KW.-hour. Their working figure was 28¾ lb. in 1892, and this was reduced to 15 lb. in 1893. Since then they had come steadily down until they now ran at a figure of 3 lb. As to underground mains, he could never understand why stamped-steel bridge pieces should continue to be used, as they seemed to be simply inviting trouble by giving contact between the lead sheathing of the cable and the surrounding soil. He believed Mr. Starr was correct in saying that for outlying districts where the cartage and transport charges on the various materials amounted to quite a large sum, a specially prepared armoured cable laid direct in the ground would be found cheapest. But where cartage and transport did not run to a big sum, it would be found that the cost of wooden troughing and pitch did not exceed the cost of armouring. They had trouble with burning accidents when they used bitumen for running up the cables, but he could not remember ever hearing of a single burning accident with pitch. The fact was that pitch had such a low specific heat that a workman could put his hand into a bucket of hot pitch, which would harden on his hand without harm.

MR. J. A. ROBERTSON (Greenock) characterised Mr. Starr's paper as a very frank one. He pointed out that nearly all the power companies had adopted a frequency of 25 cycles, and asked, in the light of modern experience with rotary converters, if that would be done now if the work had to be gone over again. He asked for information on distribution losses. As to the coal strike, he thought that that was the best advertisement power supply had received from its commencement, as a commercial concern. He believed that the whole of the power stations maintained their supply without any diminution throughout the whole dispute.

MR. G. STEVENSON (B.T.-H. Co.) said that, with regard to generators, the author stated that the neutral was the "earth," which, he took it, meant that the earthing was done at the power station, and if that was so he would like to know what precaution was taken to prevent circulating current between the various machines.

MR. ROBERTSON (Glasgow) asked if there was any difficulty with the supply at 25 cycles.

MR. J. D. MACKENZIE (Glasgow) suggested that Mr. Starr might have dealt at some length with the financial aspects of the business—such as the price per unit and the average cost per unit. He asked, too, if any attempt was made to increase the demand for lighting among small consumers.

MR. STARR, in his reply, said they did not push lighting very vigorously, even in parts where there was no gas lighting, but took all people who came in their way, and as to Mr. Lackie's remarks on coal consumption with regard to greater height of efficiency, he thought he was referring to a reasonably used unit of plant in proportion to its load. In Motherwell they had not only to run 2,000 H.P. of plant, but they had to run on an average 100 to 150 H.P. of auxiliary plant to keep that going. With regard to finance, he was afraid that when it came to that they would require to make a rule debarring consumers from being present at the discussion. As to Mr. Robertson's point on distribution, he knew, speaking without actual figures, that they sent out 95 per cent. of the energy generated. From 4½ to 6 per cent. was used in the works, and they sold about 80 per cent. of what they sent out, the rest being units lost or used otherwise. As to the periodicity, a great many of their consumers who started on 50 were now getting 25 cycles and did not know the difference.

Electrical Industry.—In the annual report of the Wolverhampton Chamber of Commerce, the following reference is made to the electrical engineering industry: "This industry, during the past 12 months, has continued to expand, and the local factories have been very well supplied with orders, and many important plants have been installed at home and in various parts of the world. The use of electricity is extending rapidly in almost every direction where power and artificial light are required. Electricity is also beginning to be used very largely for domestic purposes, and a considerable volume of business is now being done in house radiators, cookers, vacuum cleaners, &c. The rapid recent development of wireless telegraphy has made a great demand for electrical machinery, of which a very large proportion has been supplied locally. The outlook for electrical manufacturers is decidedly encouraging, the intense 'cut-throat' competition which has existed for the past six or seven years is abating, and better prices are being obtained."

LEGAL.

AMALGAMATED RADIO-TELEGRAPH CO., LTD.

IN the Chancery Division, on Tuesday, June 25th, Mr. Justice Swinfen Eady had before him a motion in the matter of the Amalgamated Radio-Telegraph Co., Ltd., to declare dissolution void.

MR. WELLS said the company went into voluntary liquidation in March, 1908; the property of the company consisted of a number of patents in connection with wireless telegraphy. Some difficulty was found in disposing of the assets and obtaining a purchaser, but eventually a purchaser was found and steps were taken to complete the sale. Disputes, however, arose and litigation ensued, with the result that the sale had never been completed. The matters arising in the litigation were adjusted, but by arrangement with the purchaser it was agreed that certain patents should not be transferred for a couple of years. Forgetting this fact, the liquidator convened a final meeting of the company, and in February last it became technically dissolved. The purchaser had now called the attention of the liquidator to the fact that certain patents had yet to be assigned, and it was for the purpose that the assignment of these patents might be completed that application was now made to his Lordship to re-open the company.

His LORDSHIP: Who are to pay the costs and expenses?

COUNSEL said an arrangement had been made between the purchaser and the liquidator with regard to that.

His LORDSHIP made the necessary order.

THE TELEPHONE ARBITRATION.

(*Continued from page* 1026.)

MR. GILL was questioned by MR. BUCKMASTER with regard to a charge of £4,000,000 in respect of supervision and engineering expenses, which counsel said was nearly 25 per cent. of the total cost of construction. He asked witness if it did not strike him as strange.—Mr. Gill replied that it did not. The figures given which produced that sum were, in his opinion, well founded.

MR. BUCKMASTER: Can you give me an illustration of any undertaking in which the cost of construction has been loaded with any item comparable to it?—I am a telephone engineer, and my experience is confined to that.

The measure of your outside experience does not tell you whether this charge is high or low?—What the cost of a railway undertaking may be does not tell you what the cost of a telephone undertaking would be.

As far as the reasonableness of this claim is concerned, your judgment depends on the fact that figures have been produced to you by officers of the company which have caused this total to be introduced?—That is a very unfair way of putting it. You infer that figures have been produced to me and I have accepted them blindly.

You told me you did not know the items which made up the totals?—That is a different thing.

Well, it seems to me it is everything.

Counsel next cross-examined witness at considerable length on the question of supervision charges, with a view of showing that the company's experts had adopted a wrong incidence with regard to these charges. Witness put in a table showing an expenditure of £27,000,000 on capital and revenue accounts, land and buildings, from 1895 to 1910, and said it included supervision and engineering. The head office charges in the tables were given at £1,500,000, a proportion of head office expenses on the total outlay of 5½ per cent.

The SOLICITOR-GENERAL continued the cross-examination of Mr. Gill, dealing with the item of underground cables. The agreed inventory of these, stated witness, he had priced out.

The SOLICITOR-GENERAL: The total exceeds £3,276,000?—Witness said this was so, and the tables which had been handed in gave the details. Continuing, he added that in laying a cable they were bound to have a certain amount of waste through overlap. It would be impracticable in working to allow the workmen the exact distance of cable only. If a slight mistake were made in such a case, the whole of the cable might be wasted. In every £100 of cable laid the waste was to the extent of about £3 12s. all round, over and above the wastage at the joint.

The SOLICITOR-GENERAL asked witness what would be a reasonable amount, in yards, to apply as wastage to this valuable cable, worth £1,000 per mile, when laying a mile of it.—Witness said he could not state it, except the percentage already given—3·6. There were a number of firms who supplied cables and laid them at an overall price, including wastage, jointing, &c., and he agreed that the prices they might undertake to do the work for could be taken as a criterion of the fair market figure for executing such works, providing they fulfilled all the conditions. He had been chief engineer to the company since 1902, and the company had always laid their own cables. They might possibly have had cables laid as suggested, but it would be so small an amount that he did not recollect it.

The SOLICITOR-GENERAL put it to witness that his valuation for tools showed that he considered their value varied with the amount paid for labour. He asked witness if he did not think this an absurdity.—Witness said he was not aware of any other way. Where the work was constant and steady he thought it reasonable.

Do you say that in order to arrive at the right amount to attribute to tools you can depend on a calculation which assumes that

the value of tools used varies with the amount paid to the labourers who use them?—Yes.

The SOLICITOR-GENERAL: Am I right in assuming that the principle of that method is illustrated again and again in the percentages which you have used in these tables?—Yes, to some extent.

The SOLICITOR-GENERAL said he was bound to go into this point, because it involved hundreds of thousands, and it might be millions. Would witness be surprised to know that according to his percentages, supervision upon the works and plant came to 4 millions, or nearly 40 per cent. of the whole, and that after he had already added 3 per cent. for supervision of contractors' works?—Witness said no; it was a question of percentages, and expressed the opinion that counsel was trying to frighten him with huge figures.

MR. GILL, in reply to the SOLICITOR-GENERAL, explained an item of £5,080,249 which was entered in the company's books as capital expenditure over a period of six years. Witness stated that after making deductions for supervision, &c., the cost of the plant for that period amounted to £4,404,000. The sum shown in the company's books for capital expenditure was not the total amount that should be shown under that heading, because the company had consistently charged to its revenue account items which he believed should properly be charged to capital account. For instance, engineering should be charged to capital account, but the company had regularly made it a revenue charge. Witness said he could not give the figure for the cost of poles during the same six years.

SIR JAMES WOODHOUSE asked him why he could not.—Witness replied that the company did not keep accounts of its expenditure on poles distinct from that on wires, because the men who erected the poles also put up the wires. The construction account was treated as a whole.

The SOLICITOR-GENERAL remarked that that was unfortunate. He asked witness what was the work which had cost £4,000,000 for supervision. "Was it wages," he queried, "Who were the lucky people who had got £4,000,000?"—Witness replied that there were a great number of figures, and they were spread over a long period. The figures were not all accountable to wages, however. He could not say what amount was for wages.

SIR J. SIMON: The figure is absurd. You are asking the country to pay £4,000,000 sterling for the privilege of having your staff supervised in the past. What does it mean in substance?—MR. GILL replied that another witness had the figures.

Do you really think that if a contractor was going to do this work for £11,000,000 plant cost, he would want another £4,000,000 for supervision?—Yes.

In the course of further cross-examination, SIR J. SIMON asked if it were not a fact that the National Telephone Co. had had some of its important exchanges constructed by contract.—Witness said that about 33 per cent. of the value of the whole exchange equipment had been constructed by contractors.

Are some of the large exchanges included in that 33 per cent.?—Yes.

Has this practice of having part of your exchanges constructed by contractors been instituted over a substantial period, or has it only been resorted to recently?—I should say, roughly, since 1904.

During 1903-4 the greater part of the exchanges erected were done by contractors?—Witness admitted that that was so.

Have you had more than one contractor?—No, only one, the Western Electric Co.

MR. JUSTICE LAWRENCE: Is that an English company?—Witness: Legally, it is an English company. It is recognised by the Post Office as an English company.

The SOLICITOR-GENERAL: Oh, yes. Do not think I desire to attack that company in any way.

Counsel said he would like a list of these contracts, and witness promised to supply counsel with a list, mentioning that there were about 66 of them.

Questioned with regard to depreciation and sinking-fund charges, MR. GILL said that if the life of any article was 20 years, it would depreciate under ordinary circumstances at precisely the same rate as any other article, the life of which was given at the same period. That was to say, putting on one side special circumstances, when material things had reached about one-half through their lives they had lost about one-third their value. He had worked on this basis in calculating the values of the telephone plant of the company.

Questioning witness further upon this doctrine, SIR J. SIMON asked whether it was not a fact that in the case of aerial cables there came a period eventually when, owing to the action of the atmosphere, the cable ceased to give satisfactory service.—Witness said that that was so.

And that is a point which can only be discovered by careful examination?—Yes.

If that is so, am I not right in saying that as aerial cable gets older its efficiency gets less, and its cost of maintenance gets more?—No, because long before it reaches that point it is dead. If you insist on keeping plant alive when it is coming to the end of its proper life, I admit there is bound to be extra charge for maintenance. For instance, if a pole has decayed and you insist on propping it up, and doing foolish things like that, there are bound to be extra maintenance charges, but that is not the position I take up at all.

A consultation having taken place at this juncture between the parties, the SOLICITOR-GENERAL said they were trying to agree as to the figures given for the age of the company's plant. There had been an agreement as to some of the company's plant, and as regarded the rest, the company had given figures but not the statistics on which the figures were based. By having the statistics they might be able to agree upon the calculations being fair. The figures would also assist in the speculation as to the life of certain of the plant.

SIR A. CRIPPS agreed that the statistics ought to be, and would be, supplied to the Postmaster-General. It would shorten the cross-examination and save time.

In reply to SIR J. SIMON, witness said that the probability of the company's undertaking being acquired by the Government did not give the plant additional life.

The cross-examination of the witness was concluded.

MR. BUCKMASTER said the company had based their figures of value of materials on the average prices taken over a period of years. The investigation of that part of the claim involved inquiry into the prices of materials during each year of the period taken. They had been busily engaged in an endeavour to arrive at an arrangement, and he was glad to say, as far as tin, lead and copper were concerned, they had been able to agree to the figures as to quantities, but the principle upon which the value should be taken would have to be discussed. He hoped the parties would be able to come to a similar arrangement with regard to iron.

MR. JUSTICE LAWRENCE said he was sure it would be found to be advantageous if the process could be continued.

MR. STANLEY JAMES GODDARD, chartered accountant and an Associate of the Institution of Electrical Engineers, was then called, and said that from 1892 to 1907 he acted as chief assistant to the general manager of the National Telephone Co., and since that date he had been general superintendent of the company. He had made a careful investigation of the books of the company, the cost of district and local management charges, local engineering supervision, wayleaves, &c. When it became necessary to frame the company's claim, special investigations had to be made, in order to arrive at the figures which had to be added to the ordinary plant cost as shown by the company's books. The investigations in support of the company's claim started in July, 1909, and had continued up to the time of the present proceedings.

(To be continued.)

NEWBERRY *v.* BRISTOL TRAMWAYS & CARRIAGE CO., LTD.

ON June 22nd, at the Bristol Assizes, plaintiff claimed damages from defendants for personal injuries sustained, owing to the trolley arm having slipped off the wire whilst he was travelling on an electric tramcar.

According to the *Times* report, it was alleged that the arm was pulled down with a rope by the conductor, broke out of the socket, and fell on the plaintiff.

Counsel for the defendants said it would be a serious matter for tramway undertakings everywhere if the plaintiff succeeded in such a case. Evidence was called to prove that the trolley arm had broken by coming into contact with the transverse wires. Tramway officials from Leeds, Sheffield and elsewhere gave evidence that the trolley was perfect.

The jury awarded £150 damages, and expressed the view that the defendants knew the use of the trolley was risky. A stay of execution was granted.

DAMAGES FOR A TRAMCAR ACCIDENT.

AT a trial before Mr. Justice Bankes and a common jury, Miss Jane Franks, of Crisp Street, Poplar, was awarded £15 damages against the L.C.C. in respect of injuries sustained in December last, alleged to have been caused through a tramcar conductor improperly starting the car without warning.

His LORDSHIP expressed the opinion that it was a fit case for the High Court, and awarded High Court costs.

SALE *v.* MANCHESTER CORPORATION.

AT the Manchester Police Court on Monday, Mr. Brierley, the city stipendiary, gave his decision in a case in which the defendants were summoned for having an alleged dangerous and defective tramline at the corner of Upper Lloyd Street and Moss Lane East. The case had been adjourned to give the stipendiary an opportunity to inspect the line. The summons was issued at the instance of Mr. John Sale, greengrocer and fruiterer, Emden Street, Moss Side, for whom Mr. Burgis (instructed by Mr. Lewis) appeared. Mr. Burgis stated that the complaint arose owing to the condition of one of the inside rails on the curve at the corner of Upper Lloyd Street and Moss Lane East. The allegation was that the groove of the line was ½ in. wider than was required by the Board of Trade, with the result that the wheels of bicycles and vehicles were likely to enter it. Another danger was that the "lip" side of the rail was higher by ½ in. than the "tread" side. These defects rendered the road unsafe for traffic at this point, and had actually caused a number of accidents, though none of a fatal character.

MR. SUTTON, who represented the Corporation, denied that the line was dangerous.

MR. BRIERLEY, in giving his decision, said the complainant had to prove that there was some substantial danger to the ordinary traffic in the present state of the rail, over and above any element of risk that might be necessarily incidental to the laying of tramway rails in the city. He said he had inspected the groove in question and also other grooves in the same quarter of the town, and he had come to the conclusion that this curve was dangerous to the ordinary traffic, and therefore he was bound to convict. There must be a penalty of £5. The complainant was entitled to reasonable costs of his summons.

MR. BURGIS pointed out that when the case should first have come before the Court the defendants asked for an adjournment after complainant had got all his witnesses present—some coming from London. On that occasion it was agreed that the question of costs should be considered after the decision.

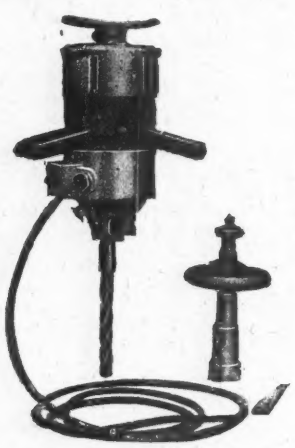
The STIPENDIARY allowed 30 guineas costs for the two days.

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

Witton-Kramer D.C. Portable Drills.

In these machines, which are of the self-contained type, the motor is fitted with two aluminium end shields, the top shield enclosing the brush gear, and carrying the feed screw of the breast-plate, while the bottom shield forms the gear case and the bearing for the drill spindle. The motor is series-wound, so that the speed at which the drill rotates can be controlled by the operator, by varying the amount of feed pressure exerted; the heavier the pressure the slower the speed, and therefore it is possible to adjust the speed to suit the material to be drilled, without the aid of mechanical devices.

The tools are standardised in two sizes, the small machine, which is illustrated below, being used either as a breast drill, or, when desired, as a feed-screw drill, and being capable of drilling holes $\frac{5}{8}$ in. in diameter into steel by breast pressure, or $\frac{3}{4}$ in. diameter into steel with feed screw. The drilling speed is 300 R.P.M., and the



WITTON-KRAMER ELECTRIC DRILL.

weight of the tool complete is 28 lb. With a machine of this type it is possible to drill holes of $\frac{3}{4}$ in. diameter through $1\frac{5}{8}$ in. mild steel with a feed screw in $2\frac{1}{2}$ minutes. The larger machine is capable of drilling holes up to $1\frac{1}{2}$ in. diameter into cast-iron, or $1\frac{1}{4}$ in. into steel, at a speed of 125 R.P.M., and the weight complete is 60 lb. It is provided with a telescopic feed screw, and both machines have Morse taper sockets in the drill spindle. With the larger tool it is possible to drill holes of $1\frac{1}{4}$ in. diameter into $2\frac{1}{2}$ in. cast-iron in 1 minute 35 seconds, this being the average time of drilling 38 holes.

Special attention has been paid to the solidity and reliability of all working parts, which, whilst increasing the weight slightly, gives undoubted advantages through the increase in life and freedom from breakdown.

These drills are made by the Witton-Kramer Tool & Hoist Co., for whom the GENERAL ELECTRIC CO., LTD., are the sole selling agents.

Yacht-Lighting Accumulators.

MESSRS. PRITCHETTS & GOLD, LTD., of 58, Victoria Street, S.W., have brought out a new pattern of yacht-lighting cell, in which the positive plates are of the standard P. & G. Planté formed type, and the negatives of the modern box-grid or cage pattern, contained in teak boxes with lead linings; the weight is low in proportion to the capacity, reliability and durability of the cell. As an instance, the Pritchett Y C 11-plate accumulator, giving an output of 50 amperes for seven hours, weighs 138 lb. per cell, and only occupies a space of $11\frac{1}{4}$ in. × $9\frac{1}{2}$ in. × $19\frac{1}{2}$ in. high overall. The cells generally follow the design of the Pritchett train-lighting accumulator, which is extensively used on railway systems in Great Britain and other countries, and has proved itself capable of withstanding rough treatment.

These accumulators can be supplied fitted either with bolted lids and india-rubber joint rings, or with Messrs. Pritchetts & Gold's patent double lids, which do away with the necessity of bolts and joint rings. If desired, the cells can also be provided with a float, which will indicate the level of the electrolyte.

NEW PATENTS APPLIED FOR, 1912.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. W. P. THOMPSON & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

13,552. "Unspillable electric accumulator cells." W. THOMSON. June 10th.

13,584. "Portable electric battery lamps." K. R. SMITH. (Divided application on 13,768, December 8th, 1911.) June 10th. (Complete.)

13,590. "Means for supplying current to electric railways and the like." N. MAZEN and P. LACROIX. (Convention date, June 10th, 1911, France.) June 10th. (Complete.)

13,599. "Receiving apparatus for electric telegraphs." W. J. LYONS. June 10th.

13,645. "Gearing electric tramway and railway motors and the like." W. H. TURNER and W. H. ISHERWOOD. June 11th.

13,669. "Switch clutch." J. KIEREN. June 11th. (Complete.)

13,679. "Searchlights." L. PASQUALINI. June 11th. (Complete.)

13,680. "Electric searchlights." L. PASQUALINI. June 11th. (Complete.)

13,695. "Contact fingers for electric controllers or the like." A. H. SALISBURY-DYER. June 11th.

13,737. "Iron or steel tubes as used for bedsteads, conduits for electric wires or cables, and for other purposes." A. L. F. CARR. June 12th.

13,740. "Switches for multiple unit control systems." P. S. TURNER. June 12th.

13,746. "Apparatus for electro-plating." G. P. M. LEE. June 12th.

13,747. "Apparatus for electro-plating." G. P. M. LEE. June 12th.

13,763. "Electric railways and the like." A. DE VERE MACLEAN. June 12th.

13,767. "Manufacture of metallic filaments for incandescent lamps." E. R. GROTE. June 12th.

13,768. "Telephones and other apparatus embodying exposed diaphragms." E. A. GRAHAM. June 12th. (Complete.)

13,771. "Direct-current dynamo-electric machinery." W. G. FRANCE. June 12th.

13,780. "Power transmission system for driving a dynamo whose electrical energy is subsequently utilised for the electric propulsion of motor vehicles, boats, airships, or the like." P. MARINO. June 12th. (Complete.)

13,781. "Electric starting switches." J. M. SANCHEZ. June 12th.

13,788. "Machines for making incandescent lamp boxes." BRITISH THOMSON-HOUSTON CO., LTD. (Allgemeine Elektricitäts Gesellschaft, Germany.) June 12th.

13,796. "Combination electric lamp bulb and diffuser." E. L. FRENOT. June 12th. (Complete.)

13,801. "Conductor rails for electric railways and the like." C. H. MERZ and S. G. REDMAN. (Addition to 11,347/08.) June 12th.

13,804. "Swivel joint, particularly applicable to electric lamp and other similar supports." J. GOURDON. June 12th. (Complete.)

13,807. "Method of, and apparatus for, telephonically ordering cabs, messengers and the like." A. HINZPETER. (Convention date, June 12th, 1911, Germany.) June 12th. (Complete.)

13,826. "Trolley poles for electric traction." S. OLDHAM. June 13th.

13,843. "Thermo-electric generators." P. FERRA. June 13th.

13,853. "Protecting devices for telephone apparatus and the like." SIEMENS & HALSKE AKT.-GES. (Convention date, December 22nd, 1911, Germany.) June 13th. (Complete.)

13,854. "Means for indicating faults in the circuits of electrical transmission systems." SIEMENS BROS & Co., LTD. (Siemens & Halske Akt.-Ges., Germany.) June 13th. (Complete.)

13,858. "Electric relay apparatus." E. O. MÖLLER. June 13th.

13,861. "Electric heating apparatus." A. F. BERRY. (Convention date, December 28th, 1911, Norway.) June 13th. (Complete.)

13,865. "Construction of electric ceiling roses." G. MABEY. June 13th.

13,906. "Electric water-heating apparatus." E. M. T. BODDAM. June 15th.

13,942. "Electric heating elements." ELECTRIC AND ORDNANCE ACCESSORIES CO., LTD., J. D. MORRISON and L. H. DAVIES. June 15th.

13,945. "Connecting electric lamps." H. F. L. STEVENTON. June 15th.

13,962. "Electric resistances or dimmers for use in governing the flow of current through incandescent lamps." E. T. MIDDLEMISS. June 15th.

13,963. "Intercommunicating telephone systems." AUTOMATIC TELEPHONE MANUFACTURING CO., LTD., WM. AITKEN, H. COOPER and C. REMINGTON. June 15th.

13,970. "Telephone systems." AUTOMATIC TELEPHONE MANUFACTURING CO., LTD. (Automatic Electric Co., United States.) June 15th. (Complete.)

13,971. "Telephone systems." AUTOMATIC TELEPHONE MANUFACTURING CO., LTD. (Automatic Electric Co., United States.) June 15th. (Complete.)

13,972. "Signalling systems." AUTOMATIC TELEPHONE MANUFACTURING CO., LTD. (Automatic Electric Co., United States.) June 15th. (Complete.)

13,973. "Telephone systems." AUTOMATIC TELEPHONE MANUFACTURING CO., LTD. (Automatic Electric Co., United States.) June 15th. (Complete.)

13,974. "Telephone systems." AUTOMATIC TELEPHONE MANUFACTURING CO., LTD. (Automatic Electric Co., United States.) June 15th. (Complete.)

13,975. "Telephone systems." AUTOMATIC TELEPHONE MANUFACTURING CO., LTD. (Automatic Electric Co., United States.) June 15th. (Complete.)

13,988. "Electrodes." BRITISH THOMSON-HOUSTON CO., LTD. (General Electric Co., United States.) June 15th.

13,989. "Controlling plurality of apparatus by means of Hertzian waves." T. E. R. PHILLIPS. June 15th.

13,997. "Dash-pot devices applicable to electric circuit-breakers and other apparatus." W. A. HARRIMAN and A. REYROLLE & CO., LTD. June 15th.

14,015. "Wireless telegraphy." W. DUBILIER. June 15th.

14,026. "Route indicators for tramcars and the like." R. R. GREENE. June 15th.

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1911.

ELECTRICAL SWITCHING APPARATUS. F. J. Walton. 11,699. May 15th. (November 15th, 1911.)

AUTOMATIC ELECTRIC FIRE-ALARMS. O. Rennert. 12,485. May 23rd. (May 23rd, 1910.)

ELECTRICAL HEATING APPARATUS. W. P. Perry. 12,923. May 30th.

MEANS FOR VARYING THE INDUCTANCE OF ELECTRIC CIRCUITS. G. Schieferstein. 12,978. May 30th. (May 30th, 1910.)

ELECTRICAL CONTACTS. Anschütz & Co. 16,440. July 17th. (November 26th. 1910.)

"ELECTRICAL REVIEW" LIS

	Place.	Supply Authority.	Year of opening.	Engineer.	Pressure of supply, volts.	Frequency and phase.	Total capacity of plant in kw.	Max. load recorded in kw.	Storage battery, max. discharge.	Total capital expended.	Private lighting.	Public lighting.	No. and h.p. of private motors.	No. and h.p. of traction motors.	Total co nections all kind
1	ABERDEEN	Aberdeen Corporation ..	1894	J. Alex. Bell ..	220,230 & 440 D.C., tr. 500*	Direct & 50~ 1-ph. & 3-ph.	5,969	3,456	420 kw.	£373,374	5,770 kw.	312 arc, 32 mtl.	941=5,858 h.p.	169=4,050 h.p.	11,889 kw (ex. tr.)
2	ABERTILLERY	Abertillery Urban District Council	1910	Dan Lloyd ..	250 & 500	Direct ..	182	74	..	£10,300	106 kw.	60 cbn., 200 mtl.	3=12 h.p. (pr. & htg. 15 kw.	..	122 kw.
3	ABERYSTWYTH ..	Chiswick Electricity Supply Corporation, Ltd.	1895	E. P. Perkins ..	220 & 440	Direct ..	420	220	74 kw.	£35,019	480.5 kw.	29 arc, 8 cbn., 4 mtl.	18=123 h.p.	..	585 kw.
4	ACCRINGTON	Accrington Corporation ..	1900	Harold Gray ..	230 & 460 D.C. 230&400A.C.*	50~, 3-ph., & direct	1,888	1,719	275 kw (tr. only)	£92,344	1,272 kw.	9 arc, 112 mtl.	316=1,380 kw.	50=1,900 h.p.	3,183 kw
5	ALDERLEY EDGE AND WILMSLOW	Alderley & Wilmslow Electric Supply Ltd.	1899	Edgar Heaketh..	210 & 420	Direct ..	370	149	33.6 kw.	£51,653*	629.5 kw.	258 mtl. ..	16=51½ h.p.	..	767.8 kw
6	ALDERSHOT TOWN ..	Aldershot Urban District Council	1902	F. Garside ..	210 & 420	Direct ..	440	199	150 a.	£27,975	428 kw.	19 arc, 44 mtl., 20 N.	31=77 h.p.	..	497 kw.
7	ALLOA	Alloa Corporation	1902	J. W. Napier ..	220 & 440	Direct ..	147	101.9	120 a. for 1 hour	£15,995	265 kw.	20 arc ..	23=92 h.p.	..	296.4 kw
8	ALNWICK	Newcastle-upon-Tyne Elec. Supply Co., Ltd.	1902	J.W. Summerside (Res.)*	230 & 460	Direct ..	150	150	..	..	300 kw.	..	100 kw. pr. & htg.	..	400 kw
9	ALTRINCHAM & DIST.	Altrincham Electric Supply Ltd.	1895	Geo. H. Fawcus	100	60~, 1-ph.	660	480	..	£71,916	2,209 kw.	..	28=107 h.p.	..	2,316 kw
10	ARBROATH	Arbroath Electric Light and Power Co., Ltd.	1908	J. C. Christie ..	250 & 500	Direct ..	450	319	208 kw.	£32,199	192 kw.	20 fl. arc, 40 mtl.	61=619 h.p.	..	690 kw.
11	ASCOT & DISTRICT ..	Ascot District Gas and Electricity Company	1907	A. E. Brooks ..	220 & 440	Direct ..	100*	87	57 kw.	£26,982	376.4 kw.	..	9=23½ kw.	..	393.9 kw
12	ASHTON-U-LYNE ..	Ashton Corporation	1899	N. Appelbee ..	240 & 480 tr. 500	Direct ..	1,760	1,091	..	£85,525	1,083 kw.	98 arc, 123 cbn., 164 mtl.	164=851 h.p.	130=3,000 h.p.	4,889.5 kw
13	ATHERTON	Atherton Urban Dist. Council*	1908	Chas. T. Astbury	240 A.C., 500 D.C.	50~, 2-ph. & direct	800*	450	..	£13,000	200 kw.	12 arc ..	26=450 h.p.	..	500 kw.
14	AYR	Ayr Corporation	1896	Roland Marshall	100 & 200A.C. 250&500D.C.*	60~, 1-ph., & direct	1,525	896	145 kw.	£108,867	1,691 kw.	109 arc, 242 mtl., 6 N.	188=500 h.p.	32=800 h.p.	2,759 kw
15	BANBURY	Banbury & District Electric Supply Co., Ltd.	1908	Arthur J. Wray	230 & 460	Direct ..	962	350	100 kw.	..	408 kw.	..	67=527½ h.p.	..	898 kw.
16	BANGOR (WALES) ..	Bangor Corporation	1900	Price F. White..	200 & 400	Direct ..	440	220	84 kw.	£30,116	424 kw.	..	23=118 h.p.	..	508 kw.
17	BARKING	Barking Urban District Council	1899	H. L. Howard ..	230 & 460	Direct ..	1,010	478	..	£60,000	461 kw.	19 arc, 494 inc., 54 Nernst	64=498 h.p.	24=600 h.p.	1,476 kw.
18	BARNES, MORTLAKE & EAST SHEEN	Barnes Urban District Council	1901	C. S. Davidson..	210 & 420	Direct ..	1,470	710	300 kw.	£77,189	1,440 kw.	571 mtl., 236 N.	62=424 kw.	..	2,629 kw.
19	BARNSLEY	Barnsley Corporation	1900	R. A. Barker ..	230 & 460, tr. 500	Direct ..	1,825	910	150 kw.	£91,887	1,947 kw.	110 arc, 707 mtl.	148	..	2,576 kw.
20	BARNSTAPLE	Barnstaple Corporation ..	1908	J. W. Hadfield..	230 & 460	Direct ..	375	195	41.4 kw.	£31,600	525 kw.	80 arc, 78 cbn. 93 mtl.	26=70 h.p.	..	618 kw.
21	BARROW-IN-FURNESS	Barrow-in-Furness Corporation	1890	H. R. Burnett ..	220 & 440 tr. 500	Direct ..	1,535	1,060	300 kw.	£118,208	1,985 kw.	82 arc, 106 cbn., 43 mtl.	218=1,472 kw.	40=1,072 h.p.	4,577 kw.
22	BATH	Bath Corporation	1890	Francis Teague	100 A.C., 220 D.C.	100~, 1-ph., & direct	1,900	1,258	850 kw.	£170,538	2,797 kw.	153 arc, 289 mtl.	228=950 h.p.	..	3,699 kw.
23	BATLEY	Batley Corporation	1908	S. D. Jones ..	230 & 440D.C. tr. 500 to 550	Direct ..	850	597	90 & 150 kw.	£48,943	553 kw.	25 arc, 50 inc.	113=576 h.p.	32=1,173 h.p.	1,908 kw.
24	BECKENHAM	Beckenham Urban District Council	1900	J. E. Tapper ..	200 & 400 tr. 500 D.C.	50~, 1-ph.	1,800	706	500 kw.	£129,000	1,784 kw.	17 arc, 34 mtl.	23=56 h.p.	..	1,956 kw.
25	BEDFORD	Bedford Corporation	1894	R. W. L. Phillips	105 & 210 tr. 500 D.C.	60~, 1-ph.	2,240	1,155	..	£136,290	3,016 kw.	35 arc, 1,784 mtl.	100=972 h.p.	..	4,050 kw.
26	BELFAST	Belfast Corporation	1895	Thos W. Bloxam	220 & 440 tr. 550	Direct ..	10,300	8,871	100 a.	£382,846	7,112 kw.	33 arc	7,716 h.p. ..	3,685 kw. ..	17,572 kw.
27	BERWICK-UPON-TWEED	Urban Electric Supply Co., Ltd.	1903	V. E. Angwin ..	240 & 480	Direct ..	180	160	93 kw.	£31,172	327 kw.	17 arc, 17 mtl., 8 Nernst	68=325 h.p.	..	715 kw.
28	BEXHILL-ON-SEA .	Bexhill Corporation	1900	W. T. Le Feuvre	220 & 440	Direct ..	1,150	525	23 kw. for 10 hrs.	£73,093	1,610 kw.	35 arc, 429 mtl.	57=128 h.p.	..	1,700 kw.
29	BEXLEY	Bexley Urban District Council	1903	C. Mittelhausen	200 &400A.C., tr. 500 D.C.	50~, 1-ph.	450	302	37 kw.	£16,440*	399 kw.	241 inc. & mtl., 54 N.	14=28.3 h.p.	32=800 h.p.	1,167 kw. (approx.)
30	BIRKDALE	Birkdale District Electric Supply Co., Ltd.	1902	H. Bentham ..	230 & 460 tr. 550	Direct ..	390	363	..	£41,104	1,076 kw.	8 arc, 353 mtl.	6=19½ h.p.	6=105 h.p.	1,190 kw.
31	BIRKENHEAD	Birkenhead Corporation ..	1896	W. Wyld ..	230 & 460, tr. 550	Direct ..	3,425	2,200	598 kw. lg. 210 kw. tr.	£167,000 approx.	3,674 kw.	58 arc, 15 mtl.	207=1,345.5 h.p.	..	4,720 kw.
32	BIRMINCHAM	Birmingham Corporation ..	1891	R. A. Chattock..	230 & 440* tr. 550	Direct* ..	20,540	15,260	1,150 kw.	£1,398,861	11,180 kw.	..	2,398=20,085 h.p	See other Table	28,002 kw. (ex. tr.)
33	BISPHAM-WITH-NORBRECK	Bispham - with - Norbreck Urban District Council	1912	J. S. Hollinrake	250 & 500	Direct ..	96	40	22 kw.	£11,000 (approx.)	..	120 mtl. ..	1=40 h.p. ..	..	..
34	BLACKBURN	Blackburn Corporation ..	1895	P. P. Wheel-wright	110, 220 A.C., 230&440D.C.*	50~, 1-ph., & direct	7,000	3,900	550 kw.	£230,505	3,664 kw. inc. hg.	208 arc, 478 mtl.	772 = 3,557 h.p.	202=4,655 h.p.	11,238 kw.
35	BLACKPOOL	Blackpool Corporation ..	1893	Charles Furness	200 A.C., 500 D.C.	83~, 1-ph., & direct	3,850	2,755	175 kw.	£207,000	*	286 arc, 874 mtl.	226=1,421 h.p.	144=3,888 h.p.	* *
36	BLAENAU-FESTINIOG	Yale Electric Power Co. ..	1900	T. P. O. Yale ..	220, 230 & 650	Direct ..	720	..	210 a.h.	£20,000	233 kw.	170 arc & inc.	2=5 h.p. ..	700 h.p. ..	917 kw.
37	BLAIR ATHOLL	Duke of Atholl	1908	James McInnes	110 & 220D.C.	Direct ..	129	86	..	..	60 kw.	7 cbn. ..	..	180 kw. ..	240 kw.
38	BLYTH & COWPEN, & BEDLINGTONSHIRE	Northern Counties Electricity Supply Co., Ltd.	1902	C. W. Fairweather	230 & 460	Direct ..	1,000*	614	..	..	339 kw.	2 kw. ..	1,749 kw. (inc. hg.)	..	2,090 kw.
39	BOLTON	Bolton Corporation	1894	J. G. Lovely (Res.) A. A. Day ..	100&200A.C.* 230 & 460D.C.	83~, 1-ph.,* & direct	7,600	..	..	£383,718	6,046 kw.	..	1,167=11,794 h.p.	See other Table	14,884 kw.
40	BO'NESS	National Electric Construction Co., Ltd. (for the Corporation)	1905	H. G. Young ..	230 & 460	Direct ..	600*	292	36.8 kw.	£35,000	452.4 kw.	80 arc, 87 cbn., 72 mtl.	58=850 h.p.	..	718 kw.
41	BOOTLE	Bootle Corporation	1899	T. Dawson Clothier	220 & 440D.C 440 A.C.*	50~, 3-ph., & direct	2,050	1,480	150 kw.	£118,212	1,483 kw.	182 arc, 100 kw. inc.	2,852 h.p. ..	590 kw. ..	4,231 kw.
42	BOURNEMOUTH ..	Bournemouth Corporation ..	1902	I. Bulfin ..	550	Direct ..	1,200	1,000	..	£75,000*	..	132 arc ..	..	See other Table	..
43	BOURNEMOUTH, POOLE AND CHRISTCHURCH	Bournemouth & Poole Electric Supply Co., Ltd.	1889	E. Ll. Ingram ..	100&200A.C.* 250 & 500D.C.	100~, 1-ph., & direct	4,400	2,282	355 kw.	£430,206	7,093 kw.	129 mtl ..	253=636 h.p.	52=1,300 h.p.	8,963 kw.
44	BRADFORD	Bradford Corporation ..	1889	Thomas Roles ..	230&460 D.C., 230 & 400 A.C	Direct, & 50 ~, 3-ph.*	13,830 D.C.	10,314	700 kw. 250 kw. tr.	£331,880 approx.	7,319 kw. inc. bulk	68 arc, 6 cbn., 6 mtl.	2,240=12,729 h.p.	See other Table	18,305 kw. ex. tr.
45	BRAY	Bray Urban District Council	1892	W. J. U. Sowter	100 & 200	60~, 1-ph.	320	120	..	£17,000	494 kw.	33 arc, 50 cbn., 200 mtl.	4=16 h.p. ..	..	547 kw.
46	BRECHIN	North of Scotland Electric Light & Power Co., Ltd.	1901	A. F. Paterson (res.)*	240 & 480	Direct ..	182	101.6	43 kw.	£32,388	394.8 kw.	134 cbn., 124 mtl.	..	232.4 kw. ..	626.7 kw.
47	BRIDGEND & DIST. ..	Bridgend Urban District Council	1902	W. Welbury	500, & 220	60~, 2-ph.	470	220	..	£15,691	340 kw.	400 mtl.	96=530 h.p.	..	685 kw.
48	BRIDGWATER	Bridgwater & District Electric Supply & Traction Co., Ltd.	1904	Harold Walker..	230 & 460	Direct ..	200	103	49 kw.	£24,677	210 kw.	15 arc, 184 inc.	24=96 h.p.	..	300 kw.
49	BRIDLINGTON	Bridlington Corporation ..	1905	Arthur J. Beckett	220 & 440	Direct ..	750*	565	770 a.h.	£38,700	988 kw.	54 arc, 450 mtl.	50=230 h.p.	..	1,146 kw.
50	BRIGHOUSE	Brighouse Corporation ..	1898	A. Aspinall ..	230 & 460	Direct ..	Bulk.	73.47	..	£6,297	156 kw.	..	32=148 h.p.	..	267 kw.
51	BRIGHTON	Brighton Corporation ..	1891	J. Christie (Man.)	115, 230, & 460 ; tr. 550	50~, 3 ph.,* & direct	10,200	5,800	400 a.h.lg. 1200A.H.tr.	£870,398	9,345 kw.	372 arc, 1,871 mtl.	571 = 3,093 h.p.	80=2,400 h.p.	11,600 kw. (ex. tr.)
52	BRISTOL	Bristol Corporation	1893	H. Faraday Proctor	105 & 210A.C. 250 & 500D.C.	93~, 1-ph.* & direct	15,050	6,445	70 kw.	£857,457	7,661 kw.	695 arc, 52 mtl.	1,445=12,882 h.p.	..	17,504 kw.
53	BROMLEY (KENT) ..	Bromley (Kent) Electric Light & Power Co., Ltd.	1898	R. B. Barker ..	210	Direct ..	1,620	657	65 kw.	£121,600	2,440 kw.	3 mtl.	53=150 h.p.	..	2,944 kw.
54	BROUGHTY FERRY ..	Broughty Ferry Corporation	1902	J. L. Turnbull ..	230 & 460	Direct ..	150	101	250 kw.	£19,903	445 kw.	12 arc, 10 cbn., 28 mtl.	24=89 h.p.	..	506 kw.
55	BUSKO			T. Gillies (Man.)	220	Direct ..	70	42			About 66 kw.				

LIST OF ELECTRICITY SUP

No. and H.P. of traction motors.	Total connections of all kinds.	Increase during year.	Price charged per unit, pence.	System of charging.	Units sold during last complete year.	Remarks.	
2=4,050 H.P.	11,839 KW. (ex. tr.)	..	Lg. 5½ & 1½, 3½, or 4; pb. lg. 2 & 1½; pr. 2½ & ¼; tr. .9077, 1.75(co.)†	Max.dem., flat rate, cont. & special	5,170,421	Lg. & tr. stn. Supply extended into two counties. *Also A.C., lg. 280 v., pr. 400 v. †Htg. 1. Data to Mar. 31, 1912	1
..	122 KW. ..	88 KW.	Lg. 6 to 3; pb. lg. £3 9s. per 40-watt lamp; pr. 2 to 1½	Flat rate, sl. scale	72,271	Supply commenced June, 1910. Data to Mar. 31, 1912	2
..	585 KW. ..	..	Lg. 6 w. dis. to 25%; pb. lg. arc £13 13s. p.a.; pr. 2½ to 1½	Flat rate with dis.	160,331	Data to Dec. 31, 1911	3
0=1,900 H.P.	3,193 KW.	901 KW.	Lg. 4 w. dis.; pb. lg. 3; pr. 1½ to ½; htg. 1; tr. 1.2	Flat rate with discounts	3,315,512	Lt. & tr. *Tr. 550 v. Ext. in progress, two 750 KW. 6,600 v. 3-ph. gas-driven sets. Data to Mar. 31, 1912	4
..	767.8 KW.	49 KW.	Lg. 6, or fixed an. ch.+2d. p.u.; pr. 2½; pb. lg 33/7(50c.p.) 48/3(100c.p.)	Flat rate and contract	177,471	*To Dec. 31, 1911. Data to Apl. 30, 1912	5
..	497 KW.	..	Lg. 6 & 4, or 5 (arc 3); pb. lg. £2½ per post p.a.; pr. 3 & 2	Max. demand and flat rate	294,771	Data to Mar. 31, 1909	6
..	296.4 KW.	..	Lg. 4; pb. lg. 3½; pr. 2 to 1; htg. 2	Flat rate	115,609	Suction-Gas Plant. Data to May 15, 1911	7
..	400 KW.	..	Lg. 5½ & 4½; pr. & htg. 3 to 1½ with discounts	Flat rate & sliding scale	..	*C. W. Fairweather (Mgr.). Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	8
..	2,816 KW.	..	Lg. 6; pr. 1½	Flat rate, contract and special	479,336	Data to Dec. 31, 1911	9
..	690 KW. ..	..	Lg. 5; pr. sl. scale and contract	Flat rate, sliding scale & contract	573,440	Data to Dec. 31, 1911	10
..	393.9 KW.	80 KW.	Lg. 7 & 5; pr. 2	Flat rate with dis.	111,077	*Diesel Engine and mains extensions in hand. Data to Dec 31, 1911	11
0=3,000 H.P.	4,389.5 KW.	..	Lg. 3 to 2½ (by cont. 2), 2-rate, 1; pb. lg. 1.19; pr. 1½ to 0.6; tr. 1½ to 1	Sl. scale, 2-rate, con. w. dis, t. switch	2,888,295	Lighting and traction. Energy supplied to four tramway undertakings. Data to Mar. 25, 1910	12
..	500 KW.	200 KW.	Lg. 4 to 3 & spl. for mills (ch. 4½); pr. 1½ to ⅝; htg. 2	Flat rate, sl. scale, cont. & special	448,694	*Supply in bulk at 7,000 v. A.C. from South Lancs. Tramways Co., Ltd. Data to Mar. 31, 1912	13
2=800 H.P.	2,759 KW.	29 KW.	Lg. 3½; pb. lg. 2; pr. 2 to 1½; tr. 1.25	Flat rate & sliding scale	1,456,394	Lighting and traction. *Traction 500 v. Data to May 15, 1911	14
..	838 KW. ..	..	Lg. 7 & 2½ (4½ max. average); pr. 1½	Max. demand and flat rate	416,082 1911	Data to Mar. 31, 1912	15
..	508 KW...	..	Lg. 5 & 3 (2-rate); pr. 2½ to 1½	Lg. flat rate & 2-rate mtr., pr. sl. sc.	176,077	Data to Mar. 31, 1910	16
4=600 H.P.	1,476 KW.	..	Lg. 4½; pb. lg. 1.99; pr. 3½ to 1; tr. 1½	Flat rate & sliding scale	769,089	Lighting and traction	17
..	2,639 KW.	..	Lg. 3½ w. dis. to 25%; pb. lg. 1.56; pr. 1½ w. dis. to 33⅓%; htg. 1¼*	Sliding scale with discounts	1,191,470	Data to March 31, 1912. *Also 10% p.a. on rate. va., &1d. p.u. (lg.), or 1d. winter & ½d. summer (lg. & hg. or ckg).	18
..	2,576 KW.	..	Lg. 6 & 1½, or 3½ dis. 5%; pr. 1½ & sliding scale	Max. dem., flat rate & sl. scale with dis.	1,716,245	Data to Mar. 31, 1912	19
..	618 KW.	..	Lg. 5 & 4½; pb. lg. 4½; pr. 2, 2½, & 3	Flat rate w. dis., 2-rate mtr., & special	221,059	Data to Mar. 31, 1909	20
=1,072 H.P.	4,577 KW.	707 KW.	Lg. £12 p.KW. p.a. +1 p.u., or 4½ 4;* pr. £3 p. KW. p.a. +1. p.u.†	Max.dem., flat, sl. sc. 2-rate, cont. & spl.	1,404,322	Lighting and traction. *Pb. lg. arc £17½, inc. £3, £9½, and £3. †Tr. 2 to 1½. Data to Mar. 31, 1912	21
..	3,699 KW.	423 KW.	Lg. 5; pb. lg. arc £24, inc. £6; pr. 1½	Flat rate, 2-rate mtr., & cont., w. dis.	1,725,165	Supply by company 1890-7. Data to March 31, 1912 ..	22
=1,178 H.P.	1,908 KW.	..	Lg. 6 & 2; pb. lg. arc £16; pr. 3 & 1; tr. 1½	Max. demand & flat rate	954,210	Lighting and traction. Data to Mar. 31, 1912	23
..	1,956 KW.	..	Lg. 5* ; pb. lg. arc £20 p.a.; pr. 2 & 1½	Flat rate	911,840	*Free wiring 5d. per unit plus fittings rentals. Data to Mar. 31, 1909	24
..	4,050 KW.	1,308 KW.	Lg. 5½ w. dis.; pb. lg. contract; pr. 1 to 0.8	Flat rate, 2-rate mtr. w. dis., & spl. for pr.	1,925,178	Data to Mar. 31, 1911	25
685 KW. ..	17,572 KW.	2,025 KW.	Lg. 5 & 1½, or 3½ (flats 3); pb. lg. arc £15 & £10 p.a.; pr. 2½ to 1*	Max. demand & flat rate	15,031,964	Lg. & traction. 3-phase 50~ to substns. at 6,000 v. Data to March 31, 1912. *Tramways spld. at cost	26
..	715 KW. ..	61 KW.	Lg. 6 & 3; pb. lg. arc £17 p.a.; pr. 4 & 1½, spl. to large users	Max. dem., flat rate, 2-rate mtr. & cont.	280,604	Data to Dec. 31, 1911	27
..	1,700 KW.	102 KW.	Lg. 7, 2 & 1½; pb. lg. arc £23, inc. £14.14.8; pr. 2*	Max. demand & flat rate	695,599	*Prept. meters 6d. per unit. Data to March 31, 1912 ..	28
2=800 H.P.	1,167 KW. (approx.)	..	Lg. 6†; pb. lg. chn. £3½, N. £4½ p.a.; pr. 3 to 2 (day), or 6 & 2	Flat rate	562,557	Tr. stn. giving bulk supply for lg. *Also £5,137 spent on pr. stn. †Less 2½%—14 days. Data to Mar. 31, 1909	29
=105 H.P.	1,190 KW.	167 KW.	Lg. 4½; pb. lg., pr. & tr. 2 ..	Flat rate	89,246	Lighting and traction. Data to Mar. 31, 1912	30
..	4,720 KW.	563 KW.	Lg. 6, 3 & 1½, or 4; pb. lg. arc £21, inc. £2½ p.a.; pr. 1½ to 1; tr. 0.903	Max. dem., flat, sl. scale, 2-rate & cont.	4,381,900	Lg. & tr. Elec. Comm. took over the tramway gen. stations from Nov. 10, 1910. Data to Mar. 31, 1912	31
e other Table	28,002 KW. (ex. tr.)	..	Lg. 4 to 2 (spl. 2½ to 2); pr. 1.35 to 0.7; tr. 1½ to 1	Flat rate with discount	29,079,276	Lighting and traction. Data to Mar. 31, 1910. *Three ph., 25~ at 5,000 v. to substns. and to large consumers	32
..	..	..	Lg. 5 w. dis.; pb. lg. £2 10s. p.a. per pillar (1,250 hrs.); pr. 2	Flat rate	..	Station opened March, 1912	33
=4,655 H.P.	11,288 KW.	579 KW.	Lg. 6 & 3 (1 hr.) or 4; pb. lg. 1.3; pr. 1½ to 0.45; tr. 1.3	Max. dem., flat w. dis. sl. sc., 2-rate & t. sw.	4,861,935	Lg. and tr. *Traction, 500 v. D.C. Data to Mar. 25, 1912	34
=3,888 H.P.	* *	*	Lg. 6 & 2, or 4½; pb. lg. 3 & 2½; pr. 3 & 1 (htg. 1); tr. 2 to 1½	Max. dem., flat rate and sliding scale	3,236,368	Lg. and tr. *Cannot be stated at present, owing to genl. adoption of mtl. fil. lamps. Data to Mar. 31, 1912	35
0 H.P. ..	917 KW.	..	Lg. 4; pr. 4; tr. 1½ & 1 ..	Flat rate & contract	..	Lighting & traction. Water power. Data to Dec. 31, 1911	36
0 KW. ..	240 KW.	..	Lg. 5/- & 6/- per lamp, 64 watts; pb. lg. free	.. ..	..	Water-power	37
..	2,090 KW.	..	Lg. 4; pr. 2½ to 1½	Flat rate, sl. scale & contract	..	*Used as stand-by; Bulk supply from No. o/T. E. S. Co. Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	38
e other Table	14,884 KW.	8%	Lg. 3½ & 1, or 3½ less 10%; pr. 2 to 1, less 10 per cent.; tr. 1.1	Max. demand & flat rate	11,676,937	Lighting and traction station. *Also three-phase supply at 400 v., 50~; tr. 550 v. Data to March 31, 1912	39
..	713 KW.	..	Lg. 5 with dis. & spl.; pb. lg. contract; pr. 2½	Flat rate and contract	593,000 (estd.)	*Also stand-by supply=150 H.P. Data to May 15, 1910	40
0 KW. ..	4,231 KW.	319 KW.	Lg. 6 & 1½, or 3½; pb. lg. 2; pr. 2 to 1; tr. 1½ to 1	Max. demand, flat rate, cont. & spcl.	3,079,851	Lighting and traction. A.C. 3,000 v. *Traction 500 v. Data to Mar. 31, 1912	41
e other Table	..	..	Pb. lg. 2	Flat rate	1,881,688	Public lighting & traction station (92½% of output for traction.) *Station plant and cables	42
=1,300 H.P.	8,363 KW.	7.0%	Lg. 7 & 3½, or 6½; pr. 2 & 2½; tr. 1½	Max. dem., flat, w.d., 2-rate, cont. & spl.	3,078,316	Lighting and traction. *Also 400 v. A.C., and traction 580 v. D.C. Data to December 31, 1911	43
e other Table	18,805, KW. ex. tr.	2.744 KW.	Lg. 4 w. dis.†; pb. lg. arc £12½; pr. 2 to 3; htg. 2 to 1; tr. 1½ (2½nt.)	Flat rate, max.dem., sl. scale & time sw.	22,108,000 (approx.)	Lg. & tr. Lamps free (one p. 30 u.). *50~3-ph. at 6,600 v. to substns. Tr. 500 D.C. †Also 7d. & 1d. m.d. Data to 31/3/12	44
..	547 KW.	37 KW.	Lg. 6 & 3½; pb. lg., arc £15, inc. £2 p.a.; pr. 2½	Max. dem., flat rate & cont.	185,000	District residential, no industries, hence small power load. Data to March 31, 1912	45
2.4 KW. ..	636.7 KW.	13.7 KW.	Lg. 6 & 4, or 5½; pb. lg. £460 p.a.; pr. 4 & 1½, or 2½	Max. dem., flat rate, 2-rate & cont.	188,855	*F. Barrett Hills, Engineer & Manager. Data to Dec. 31, 1911	46
..	685 KW.	118 KW.	Lg. 4½ to 4 (2½% dis.); pb. lg. 2½; pr. 1½; htg. 2½	Flat rate	351,376	Data to Mar. 31, 1911	47
..	800 KW.	..	Lg. 7 & 2, or 4½ to 4; pr. 3 & 1, or 2	Max. demand & flat rate	107,592	Data to Dec. 31, 1909	48
..	1,146 KW.	..	Lg. 5 to 3½; pb. lg. arc £15, inc. & N. £4; pr. 2 to 1½; htg. 2 to 1	Flat rate & sliding scale	446,772	Extensions in hand. Data to Mar. 31, 1912	49
..	267 KW.	..	Lg. 5; pr. 4 to 1; htg. 1½ ..	Flat rate	..	Gas power. Data to Mar. 31, 1912	50
=2,400 H.P.	11,600 KW. (ex. tr.)	347 KW.	Lg. 4 & 3, or 6 & 2; pb. lg. 1½; pr. 1; tr. 1.2	Max. dem., flat rate	10,620,646	Lighting and traction. *Transmission only. Data to March 31, 1912	51
..	17,504 KW.	945 KW.	Lg. 4½ w.dis. to 30%; pb. lg. arc £21, £14½ per lp.p.a.; pr. 1½ w.dis.to 20%	Max. dem., flat rate w dis., 3-rate, special	10,458,916	*Also 50~, 3-phase, at 210 volts. Data to Mar. 25, 1912	52
..	2,944 KW.	..	Lg. 7 & 4, or 6; pr. 4 & 1, or 2½; bulk supply 2	Max. demand, flat rate & 2-r. mtr.	840,389	54 KW. bulk supply to Chislehurst at 2,000 volts D.C. Data to Dec. 31, 1909	53
..	506 KW.	..	Lg. 5½; pb. lg. 3½; pr. 3 ..	Flat rate w. dis. ..	120,097	Data to May 15, 1912	54

Place.		
LONDON.	233	LINCOLN .. .. ..
	234	LIVERPOOL .. ..
	235	LLANDILO .. ..
	236	LLANDRINDOD WELLS
	237	LLANDUDNO .. ..
	238	LLANGOLLEN .. ..
	239	LLANRWST AND TREFRIW
	240	BATTERSEA .. ..
	241	BERMONDSEY .. ..
	242	CHELSEA .. ..
	243	CITY OF LONDON ..
	244	FINSBURY .. ..
	245	FULHAM .. .. ..
	246	GREENWICH, LEWISHAM, PENGE & SYDENHAM*
	247	HACKNEY .. ..
	248	HAMMERSMITH ..
	249	HAMPSTEAD .. ..
	250	ISLINGTON .. ..
	251	KENSINGTON .. ..
	252	KENSINGTON (N. OF HIGH STREET)
	253	KENSINGTON AND KNIGHTSBRIDGE
	254	KENSINGTON AND NOTTING HILL
	255	LAMBETH .. .. ..
	256	LONDON* & WESTMINSTER
	257	MARYLEBONE .. ..
	258	MID LONDON, PADDTON, ACTON, HANWELL*
	259	POPLAR .. .. ..
	260	ST. JAMES' WESTMINSTER
	261	ST. PANCRAS .. ..
	262	SHOREDITCH .. ..
	263	SMITHFIELD MARKETS
	264	SOUTHWARK .. ..
	265	STEPNEY .. .. ..
	266	STOKE NEWINGTON ..
	267	WANDSWORTH .. ..
	268	WESTMINSTER ..
	269	WESTMINSTER & ST. JAMES
	270	WESTMINSTER, HOLBORN & CITY OF L.
	271	WOOLWICH, PLUMSTEAD & ELTHAM
	272	LONDONDERRY .. ..
	273	LONG EATON .. ..
	274	LONG EATON .. ..
	275	LONGTON .. ..
	276	LOUGHBOROUGH ..
	277	LOWESTOFT .. ..
	278	LUDLOW .. .. ..
	279	LUTON .. .. ..
	280	LYME REGIS .. ..
	281	LYMINGTON .. ..
	282	LYNTON & LYNMOUTH
	283	MACROOM .. ..
	284	MAIDENHEAD & DISTRICT

41	BOOTLE	Bootle Corporation	1899	[illegible] Clothier	440 A.C.*	& direct	[illegible]	1,480	180 KW.	£118,[illegible]	[illegible] KW.	[illegible] KW. inc.	2,852 H.P. ..	520 KW. ..	[illegible]
42	BOURNEMOUTH ..	Bournemouth Corporation ..	1902	I. Bulfin ..	550	Direct ..	1,200	1,000	..	£75,000*	..	132 arc ..	..	See other Table	
43	BOURNEMOUTH, POOLE AND CHRISTCHURCH	Bournemouth & Poole Electric Supply Co., Ltd.	1899	E. Ll. Ingram ..	100&200A.C.* 250 & 500D.C.	100~, 1-ph., & direct	4,400	2,222	355 KW.	£490,206	7,093 KW.	129 mtl ..	253=636 H.P.	52=1,300 H.P.	8,3
44	BRADFORD	Bradford Corporation ..	1899	Thomas Roles ..	380&460 D.C., 230 & 400 A.C	Direct, & 50 ~, 3-ph.*	13,880 D.C.	10,314	700 KW. 250 KW. tr.	£324,880 approx.	7,319 KW. inc. bulk	68 arc, 6 cbn., 6 mtl.	2,240=12,729 H.P.	See other Table	18,3
45	BRAY	Bray Urban District Council	1892	W. J. U. Sowter	100 & 200	60~, 1-ph.	320	130	..	£17,000	494 KW.	33 arc, 50 cbn., 200 mtl.	4=16 H.P. ..	..	5
46	BRECHIN	North of Scotland Electric Light & Power Co., Ltd.	1901	A. F. Paterson (res.)*	240 & 480	Direct ..	132	101.6	48 KW.	£32,338	394.3 KW.	134 cbn., 194 mtl.	..	282.4 KW. ..	696
47	BRIDGEND & DIST. ..	Bridgend Urban District Council	1902	W. Welbury	500, & 220	60~, 2-ph.	470	230	..	£15,691	340 KW.	400 mtl.	96=530 H.P.	..	6
48	BRIDGWATER	Bridgwater & District Electric Supply & Traction Co., Ltd.	1904	Harold Walker ..	230 & 460	Direct ..	200	103	49 KW.	£24,677	210 KW.	15 arc, 184 inc.	24=95 H.P.	..	3
49	BRIDLINGTON	Bridlington Corporation ..	1905	Arthur J. Beckett	220 & 440	Direct ..	750*	565	770 A.H.	£38,700	988 KW.	54 arc, 450 mtl.	50=230 H.P.	..	1,1
50	BRIGHOUSE	Brighouse Corporation ..	1898	A. Aspinall ..	230 & 460	Direct ..	Bulk.	73.47	..	£6,397	156 KW.	..	32=148 H.P.	..	2
51	BRIGHTON	Brighton Corporation ..	1891	J. Christie (Man.)	115, 230, & 460; tr. 550	50~, 3 ph.,* & direct	10,200	5,800	400 A.H.lg. 1200A.H.tr.	£370,928	9,345 KW.	372 arc, 1,871 mtl.	571 = 3,023 H.P.	80=2,400 H.P.	11,6 (ex
52	BRISTOL	Bristol Corporation	1893	H. Faraday Proctor	105 & 210A.C. 250 & 500D.C.	99~, 1-ph.* & direct	15,050	6,445	70 KW.	£357,457	7,661 KW.	695 arc, 52 mtl.	1,445=12,882 H.P.	..	17,5
53	BROMLEY (KENT) ..	Bromley (Kent) Electric Light & Power Co., Ltd.	1898	R. R. Barker ..	210	Direct ..	1,620	657	63 KW.	£121,699	2,440 KW.	3 mtl.	55=150 H.P.	..	2,94
54	BROUGHTY FERRY ..	Broughty Ferry Corporation	1902	J. L. Turnbull ..	230 & 460	Direct ..	150	101	250 KW.	£19,903	445 KW.	12 arc, 10 cbn., 28 mtl.	24=89 H.P.	..	5
55	BUCKINGHAM	Buckingham Electric Light Co.	1899	T. Gillies (Man.)	220	Direct ..	70	40	..	..	About 66KW.	90 mtl. ..	8=4½ H.P. ..	..	60
56	BUDE	Bude Electric Supply Co., Ltd.	1908	..	400 & 200D.C.	Direct ..	146	98	..	£13,308	..	130 mtl. ..	10	..	
57	BUNCRANA	Buncrana Electric Supply Co.	1905	John K. Swan ..	235 & 470	Direct ..	125	..	..	..	..	5 arc, 30 cbn.	55 H.P. ..	..	
58	BURGESS HILL	Burgess Hill & District Electric Supply Co., Ltd.	1906	Edward Prior ..	230	Direct ..	100	80	32 KW.	£13,000	120 KW.	..	20	..	15
59	BURNLEY	Burnley Corporation ..	1898	Jas. E. Starkie ..	110,220 & 440 tr. 500	Direct ..	2,640	1,772	66 KW. lg. 250 KW.tr.	£112,242	2,187 KW.	8 arc, 12 cbn.	241=710¾ H.P.	46=3,460 H.P.	5,29
60	BURSLEM	Stoke-on-Trent Corporation ..	1905	C. H. Yeaman ..	220 & 440	Direct ..	1,250	929	70 KW.	£53,194	883 KW.	23 arc, 42 cbn.	1,162 KW. ..	..	2,07
61	BURTON-ON-TRENT ..	Burton-on-Trent Corporation	1894	Thos. Hall ..	100 & 200A.C. tr. 500 D.C.	75~, 1-ph., & direct	1,710	689 lg. 875 tr.	..	£36,306	1,280 KW.	1 arc, 3 mtl.	195=1,221 H.P.	40=1,000 H.P.	2,19
62	BURY (LANCS.) ..	Bury Corporation	1896	S. J. Watson ..	230 & 440 tr. 500	Direct ..	2,260*	2,035	154 KW.lg. 225 KW.tr.	£117,053	3,219 KW.	36 arc, 21 inc.	314=2,506 H.P.	See other Table	5,31
63	BURY ST. EDMUNDS ..	Bury St. Edmunds Corporation	1900	S. E. Day ..	200 & 400	Direct ..	420	233	60 KW.	£35,000	440 KW.	14 arc, 424 mtl.	40=200 H.P.	..	650
64	BUXTON	Buxton Urban District Council	1900	W. J. Leeming ..	230 & 460	Direct ..	794	282	23 KW.	£48,782	993 KW.	30 arc ..	54=154 H.P.	..	1,10
65	CAMBORNE, REDRUTH AND ILLOGAN	Urban Electric Supply Co., Ltd.	1902	L. A. Hards ..	240, 480 D.C 440 A.C.*	Direct, and 25~, 3-ph.	1,545	998	200 KW.lg. 150 KW. tr.	£123,496	602 KW.	2 arc, 232 inc.	515 KW. ..	20=500 H.P.	1,640
66	CAMBRIDGE	Cambridge Electric Supply Co., Ltd.	1892	R. C. Pierce ..	200	90~, 1-ph.	1,880	672	..	£131,258	2,002 KW.	1 arc ..	252 B.H.P. ..	..	2,833
67	CAMBUSLANG	Lanark County Council ..	1905	.. .. ..	230	Direct ..	230	120	53 KW.	£16,291*	163 KW.	20 arc, 6 cbn., 468 mtl., 5 N.	13=43 H.P.	..	237
68	CANTERBURY	Canterbury Corporation ..	1893	C. A. Blascheck	230 & 440	Direct ..	900	516	66 KW.	£39,422	785 KW.	12 arc, 712 mtl.	121=537 H.P.	..	1,263
69	CARDIFF	Cardiff Corporation	1894	Arthur Ellis ..	200& 400 A.C. & D.C., tr. 500	40~, 1-ph.,* & direct	1,560 A.C. 2,500 m.g.	2,813	850 KW.	£234,883 (approx.)	5,159 KW.	102 arc, 338 cbn., 518 mtl.	618=4,079 H.P.	..	9,235
70	CARLISLE	Carlisle Corporation	1899	Sydney T. Allen	230 & 460, tr. 550	Direct ..	2,170	1,451	170 A. lg. 700 A. tr.	£94,023	1,857 KW.	53 arc, 20 mtl.	315=1,713 H.P.	80=450 H.P.	2,901
71	CARLOW	J. Alexander	1890	S. A. Hoopes ..	100 & 200	70~, 1-ph., & direct	115	..	40 KW. for 4 hrs.	..	68 KW.	13 arc, 84 inc.	1=67 H.P. ..	..	117
72	CARNARVON	National Electric Construction Co., Ltd.*	1905	D. O. Evans ..	230 & 460	Direct ..	200	157	..	..	342 KW.	..	86=217 H.P.	..	494
73	CATERHAM	Urban Electric Supply Co., Ltd.	1903	Edmund E. Walker	240 & 480	Direct ..	178	94	83.4 KW.	£35,913	440 KW.	..	106 KW. inc. htg.	..	543
74	CHAGFORD	Chagford & Devon Electric Light Co., Ltd.	1891	Geo. H. Reed ..	100	99~, 1-ph.	22	19	..	..	..	22 mtl.	..	..	
75	CHELMSFORD	Electric Supply Corporation, Ltd.	1890	K. A. Scott-Moncrieff*	100 & 200A.C., 110 D.C.	100~, 1-ph., & direct	860	377	..	£63,835	680 KW.	21 arc, 302 Nernst	65=230½ H.P.	..	925
76	CHELTENHAM & CHARLTON KINGS	Cheltenham Corporation ..	1895	Walter J. Bache	100 & 200 tr. 550	100~, 1-ph., & D.C. for tr.	2,830	1,816	165 KW.	£154,076	2,000 KW.	388 arc, 19 cbn., 6 mtl.	49=121 H.P.	40=1,240 H.P.	2,222 (ex.
77	CHEPSTOW	Chepstow Electric Lighting & Power Co., Ltd.	1904	G. L. Coventon	230	Direct ..	100	47.5	46 KW.	.. ..	116 KW.	..	3=8½ H.P. ..	..	
78	CHESHAM AND CHESHAM BOIS	Chesham Electric Light & Power Co., Ltd.	1904	R.J.J.Swan(Res.)	200, 230 & 460	Direct &50~ 3-ph.(C.B.)	500	184	100 A. for 2½ hrs.	£31,072*	223 KW.	9 arc, 203 mtl.	63=381 H.P.	..	534
79	CHESTER	Chester Corporation	1896	S. E. Britton ..	210 & 420, tr. 500	Direct ..	1,928	1,320	273 KW.est 140 KW. tr.	£120,780	1,814 KW.	212 arc, 354 cbn. 350 mtl., 179 N.	128=590 H.P.	36=1,210 H.P.	3,497
80	CHESTERFIELD	Chesterfield Corporation ..	1901	R. L. Acland ..	240 & 480 tr. 500	Direct ..	1,750	720 l. & p. 800 tr.	150 KW.	£34,000	1,335 KW.	24 arc, 48 mtl.	198=1,071 H.P.	80=760 H.P.	2,793
81	CHICHESTER	Chichester Electric Light & Power Co., Ltd.	1909	R. V. Weare (Res.)*	220 & 440	Direct ..	340	147	75 KW.	£32,000	200 KW.	325 mtl. ..	17=105 H.P.	..	270 K
82	CHISLEHURST	Chislehurst Electric Supply Co., Ltd.	1899	R. B. Baker ..	210	Direct ..	220*	92	53 KW.	£27,197	504 KW.	..	..	..	504 K
83	CHISWICK	Chiswick Electricity Supply Corporation, Ltd.	1900	A. W. Money ..	220 & 440	Direct ..	921	560.2	132 KW.	..	1,075.7 KW.	..	67=366 H.P.	..	1,482
84	CHURCH STRETTON ..	Church Stretton Electric Supply Co., Ltd.	1904	G. Payne ..	200 & 400	Direct ..	100	..	..	..	..	..	1=2 H.P. ..	..	64 KW
85	CLACTON-ON-SEA ..	Clacton-on-Sea Urban District Council	1906	H. W. Everitt ..	230 & 460	Direct ..	200	..	200 A. for 3 hrs.	£10,000	..	..	..	..	..
86	CLECKHEATON	Cleckheaton Urban District Council	1902	A. Pickersgill ..	230 & 460 tr. 550	Direct ..	800	600	115 KW.	£31,002	..	32 mtl.	121=600 H.P.	600 H.P. ..	960
87	COATBRIDGE AND AIRDRIE	Coatbridge and Airdrie Electric Supply Co., Ltd.	1894	F. J. Launchbury	240&480D.C., 400 A.C.*	Direct and 25~,3-ph.,	2,990†	1,500	480 A.H.	..	750 KW.	10 arc, 20 mtl., 140 N.	1,900 H.P. ..	..	2,948
88	COLCHESTER	Colchester Corporation ..	1898	W. Frisby ..	210 & 420 tr. 500	Direct ..	2,080	969	..	£89,038	1,880 KW.	354 mtl.,	65=163 KW.	36=544 KW.	2,663
89	COLNE	Colne Corporation	1901	A. G. Cooper ..	240 & 480 tr. 540	Direct ..	1,130	503	..	£49,084	592 KW.	1 arc., 5 mtl.	219=534½ H.P.	24=672 H.P.	1,495
90	COLWYN BAY	Colwyn Bay Urban District Council	901	A. R. Tudman ..	230 & 440	Direct ..	420	350	90 KW.	£36,842	614.4 KW.	76 arc, 13 posts mtl.	20=100 H.P.	..	689
91	CORK	Cork Electric Tramways and Lighting Co., Ltd.	1898	H. H. Nalder ..	230 & 460 tr. 500	Direct* ..	2,680	1,487 (ex. tr.)	300 KW.	£329,010†	1,955 KW.	90 arc ..	316=2,293½ H.P.	70=1,330 H.P.	4,638
92	COVENTRY	Coventry Corporation ..	1895	Geo. Tough ..	200 A.C.	50~, 2-ph.	9,000	6,090	..	£294,085	2,139 KW.	104 arc, 47 mtl.	763=8,231 H.P.	..	9,364
93	CRAWLEY	Sussex Electricity Supply Co.	1908	Edward Prior ..	230	Direct ..	80	65	40 KW.	£5,000	55 KW.	..	6=20 H.P. ..	..	60
94	CREWE	Crewe Corporation	1900	H. H. Denton ..	230 & 466	Direct ..	700	545	150 KW.	£57,155	932 KW.	34 arc, 500cbn., 752 mtl.	65=249 H.P.	..	1,205
95	CROMER	Cromer Electric Supply ..	1908	.. ..	240 & 480	Direct ..	180	160	32.5 KW.	£33,063	429 KW.	10 arc, 4 cbn. 7 mtl.	24=34 KW. .	..	471
96	CROYDON	Croydon Corporation	1896	Alec. C. Cramb ..	200 & 400 A.C.*	60~, 1-ph. & direct	5,450	3,676	156 KW.	£355,614	6,458 KW.	424 arc, 514 mtl.	388=1,644 H.P.	220=5,604 H.P.	12,765
97	DALKEITH	Electric Supply Corporation Ltd.	1904	K. A. Scott-Moncrieff*	225 & 450	Direct ..	110	47	58 KW.	£15,800	124 KW.	27 arc, 16 mtl., 14 N.	29=74½ H.P.	..	200 KW
98	DARLINGTON	Darlington Corporation ..	1900	J. R. P. Lunn ..	230 & 460 tr. 500	Direct ..	1,970	1,211	368 KW.	£73,934	1,352 KW.	55 arc ..	310=2,093 H.P.	32=800 H.P.	3,822
99	DARTFORD	Dartford Urban District Council	1901	J. D. Pember ..	230 & 460 tr. 500	Direct ..	700	656	50 KW. lg. 125 KW. tr.	£48,809	431 KW.	6 arc, 266 mtl.	70=781 H.P.	12=600 H.P.	1,455
100	DARTMOUTH	Urban Electric Supply Co., Ltd.	1909	G. E. Smith ..	240 & 480	Direct ..	830	183.6	48 KW.	£54,019	639 KW.	10 × 800-c.p. mtl., 195 mtl.	29=177 H.P.	..	809
101	DARWEN	Darwen Corporation	1899	Chas. Garnett ..	230 & 460D.C. 500&440A.C.*	50~, 3-ph., & direct	900	750	117 KW.	£64,000	772 KW.	20 arc, 4 cbn., 185 mtl.	210=1,024 H.P.	32=1,120 H.P.	1,602
102	DENNY AND DUNIPACE	Denny and Dunipace Corporation	1908	Andrew G. Merriles	230 & 400	50~, 3-ph.	..	..	..	£1,077	10 KW.	38 mtl. ..	1=5 H.P. ..	..	18 K
103	DERBY	Derby Corporation	1898	T. P. Wilmshurst	230 & 460 D.C. 200 A.C. tr. 500	40~, 1-ph. & direct	5,750	3,100	375 A.	£337,000	5,000 KW.	186 arc, 518 cbn.	220=3,500 H.P.	98=2,000 H.P.	8,000 K
104	DEVONPORT	Devonport Corporation ..	1901 tr. 1903 lg.	J. W. Spark ..	230, 460 & 500	Direct ..	1,800	1,306	670 A. lg., 1,000 A. tr.	£128,355	1,124 KW.	20 arc, 1 inc.	74=456 H.P.	92=3,220 H.P.	3,836 K
105	DEWSBURY	Dewsbury Corporation ..	1894	R. H. Campion	230 & 440, tr. 550	Direct ..	1,320	1,012	960 A.H.lg., 150 KW.tr.	£30,458	1,023 KW.	31 arc, 32 cbn., 7 mtl.	203=1,030 H.P.	28=740 H.P.	1,890 K tr. 500
106	DISS	Suffolk Electricity Supply Co., Ltd.	1896	Napier Prentice	200	Direct ..	48	23	40 KW.	..	40 KW.	..	5=8 H.P. ..	..	45 KW.
107	DOLLAR	Electric Supply Corporation, Ltd.	1904	K. A. Scott-Moncrieff*	235	Direct ..	40	17.1	15 KW.	£7,000	64 KW.	26 mtl., 8 Nernst	5=12½ H.P. ..	..	65 K
108	DONCASTER	Doncaster Corporation ..	1900	E. S. Rayner ..	230 & 460 tr. 500	Direct ..	1,700	950	75 KW.	£70,560	1,100 KW.	8 arc, 44 mtl.	85=420 H.P.	50=1,250 H.P.	2,370 K
109	DORKING	Dorking Electricity Supply ..	1904	Henry Joseph ..	240	Direct ..	150	163	49 KW.	£38,599	520 KW.	..	53 KW. (inc. htg.)	..	573 K
110	DOVER	Dover Corporation	1895	L. W. Woodman	100 & 200A.C. 500 D.C.	100~, 1-ph. & direct	1,850	691	77 KW.	£187,194	1,568 KW.	65 arc; inc. & N.=444 S-C.P.	49=244 H.P.	21=1,100 H.P.	2,963 K
111	DUBLIN	Dublin Corporation	1892	Mark Ruddle ..	lg. 200, pr. 346	50~, 1-ph. & 3-ph.	6,000	3,490	..	£536,000	4,944 KW.	557 arc, 125 mtl.	334=1,670 H.P.	..	6,788 K
112	DUDLEY	Dudley Corporation	1899	Charles E. Savage	230 &460 tr. 500	Direct ..	1,800	..	530 KW.	£93,600	1,100 KW.	55 arc,* 222 cbn.,* 90 mtl.	117=1,557 H.P.	See other Table	1,790 K (ex.
113	DULVERTON	Dulverton Electric Lighting Co., Ltd.	1904	J. P. Davis (Res.)	230	Direct ..	60	30	50 KW.	£3,780	62 KW.	35 cbn. ..	3=12 H.P.	..	72 KW
114	DUMBARTON	Electric Supply Corporation, Ltd.	1906	K. A. Scott-Moncrieff*	240 & 480 tr. 500	Direct ..	940	763	50 KW.	£43,480	191 KW.	..	69=685 H.P.	60=1,020 H.P.	800 K (ex. tr.
115	DUMFRIES	Dumfries Electric Supply Co., Ltd.	1906	Talfourd Ely, Manager*	200	Direct ..	200	52	125 KW.	£31,536	93 KW.	..	35=50 H.P.	..	137 K
116	DUNDEE	Dundee Corporation	1896	H. Richardson ..	200&400 D.C. 6,200 A.C.*	50~, 3-ph. & direct	6,500	3,087	140 KW.	£338,861	5,204 KW.	110 arc, 22 mtl.	797=3,403 KW.	144=3,580 H.P.	15,339 K
117	EALING	Ealing Corporation	1894	J. Douglas Knight	103 & 204	40~, 1-ph.	1,770	1,183	94 KW.	£205,858	..	73 arc, 804 mtl.	57=196 H.P.	.	4,197 K

	220 KW. ..	4,231 KW.	319 KW.	Lg. 6 & 1½, or 8½; pb. lg. 3; pr. 2 to 1; tr. 1½ to 1	Max. demand, flat rate, cont. & spcl.	5,073,351	Lighting and traction. A.C. 3,300 v. *Traction 500 v. Data to Mar. 31, 1912	41	273 LONG EATON .. ..
	See other Table	..	..	Pb. lg. 2	Flat rate	1,831,633	Public lighting & traction station (92½% of output for traction.) *Station plant and cables	42	274 LONG EATON .. ..
P.	52=1,300 H.P.	8,363 KW.	7.0%	Lg. 7 & 3½, or 6½; pr. 2 & 2½; tr. 1⅝	Max. dem., flat, w.d., 2-rate, cont. & spl.	3,078,316	Lighting and traction. *Also 400 v. A.C., and traction 580 v. D.C. Data to December 31, 1911	43	275 LONGTON .. ..
9	See other Table	18,805 KW. ex. tr.	2.744 KW.	Lg. 4 w. dis.†; pb. lg. arc £12½; pr. 2 to ⅔; htg. 2 to 1; tr. 1½ (2¼nt.)	Flat rate, max.dem., sl. scale & time sw.	22,108,000 (approx.)	Lg. & tr. Lamps free (one p. 30 n.). *50~3-ph. at 6,600 v. to substns. Tr. 500 D.C. †Also 7d. & 1d. m.d. Data to 31/8/12	44	276 LOUGHBOROUGH ..
	..	547 KW.	87 KW.	Lg. 6 & 3½; pb. lg., arc £15, inc. £2 p.a.; pr. 2½	Max. dem., flat rate & cont.	185,000	District residential, no industries, hence small power load. Data to March 31, 1912	45	277 LOWESTOFT .. ..
	232.4 KW. ..	626.7 KW.	13.7 KW.	Lg. 6 & 4, or 5½; pb. lg. £460 p.a.; pr. 4 & 1½, or 2½	Max. dem., flat rate, 2-rate & cont.	138,855	*F. Barritt Hills, Engineer & Manager. Data to Dec. 31, 1911	46	278 LUDLOW .. .. ..
P.	..	685 KW.	118 KW.	Lg. 4½ to 4 (2½% dis.); pb. lg. 2½; pr. 1½; htg. 2½	Flat rate	351,276	Data to Mar. 31, 1911	47	279 LUTON .. .. ..
	..	800 KW.	..	Lg. 7 & 2, or 4½ to 4; pr. 3 & 1, or 2	Max. demand & flat rate	107,592	Data to Dec. 31, 1909	48	280 LYME REGIS .. ..
	..	1,146 KW.	..	Lg. 5 to 3½; pb. lg. arc £15, inc. & N. £4; pr. 2 to 1½; htg. 2 to 1	Flat rate & sliding scale	446,772	Extensions in hand. Data to Mar. 31, 1912	49	281 LYMINGTON .. ..
	..	267 KW.	..	Lg. 5; pr. 4 to 1; htg. 1½ ..	Flat rate	..	Gas power. Data to Mar. 31, 1912	50	282 LYNTON & LYNMOUTH
3	80=2,400 H.P.	11,600 KW. (ex. tr.)	347 KW.	Lg. 4 & 3, or 6 & 2; pb. lg. 1½; pr. 1 : tr. 1.2	Max. dem., flat rate	10,630,646	Lighting and traction. *Transmission only. Data to March 31, 1912	51	283 MACROOM .. ..
32	..	17,504 KW.	945 KW.	Lg. 4½ w.dis. to 30%; pb. lg. arc £21, £14½ per lp.p.a.; pr. 1½ w.dis. to 20%	M ax. dem., flat rate w dis., 2-rate, special	10,458,916	*Also 50~, 3-phase, at 210 volts. Data to Mar. 25, 1912	52	284 MAIDENHEAD & DISTRICT
P.	..	2,944 KW.	..	Lg. 7 & 4, or 6 ; pr. 4 & 1, or 2½ ; bulk supply 2	Max. demand, flat rate & 2-r. mtr.	840,382	54 KW. bulk supply to Chislehurst at 2,000 volts D.C. Data to Dec. 31, 1909	53	285 MAIDSTONE .. ..
	..	506 KW.	..	Lg. 5½; pb. lg. 2½ ; pr. 3 ..	Flat rate w. dis. ..	120,097	Data to May 15, 1912	54	286 MALTON & NORTON
	..	60 KW. ..	..	Lg. 7 w. dis.; pb. lg. contract ..	Flat rate with dis.	..	Part gas power. Data to Dec. 31, 1911	55	287 MALVERN .. ..
	..	..	..	Lg. 5 ; pr. 2	Flat rate	111,745	.. ..	56	288 MANCHESTER .. ..
	..	..	..	Lg. 5; pb. lg. contract; pr. 1½..	Flat rate with dis.	..	.. ..	57	289 MANSFIELD .. ..
	..	150 KW.	..	Lg. 6 ; pr. 4	Flat rate	55,000	Suction gas power; overhead mains. Data to Sept., 1911	58	290 MARDY (CLAM.) ..
P.	46=3,460 H.P.	5,297 KW.	..	Lg. 3½ ; pb. lg. 1½ ; pr. 1½ & 1 ; tr. 1½	Lg., flat rate ; pr., max dem. w. dis.	3,249,387	Lighting and traction. Data to Mar. 31, 1910	59	291 MARGATE & BROADSTAIRS & S. PETERS
	..	2.071 KW.	..	Lg. 7 & 2, or 5, ares 3; pb. lg. 3; pr. 2 to 1; htg. 1	Max. demand, flat rate & sl. scale	1,688,913	Data to Mar. 21, 1912	60	292 MARKET DRAYTON ..
P.	40=1,000 H.P.	2,190 KW.	8.25%	Lg. 5, or 6 & 3 ; pb. lg. 3; pr. 1 to ¾, or 3 & 1, or 2 to 1½* ; tr. av. 1.37	Max. demand, flat rate, & sl. scale	2,009,500	Lighting and traction. *Pr., 80% of total on restricted-hour system : htg. & ckg. 1d. Data to Mar. 31, 1912	61	293 MELTON MOWBRAY ..
P.	See other Table	5,317 KW.	..	Lg. 8½, 3½, 2½ ; pb. lg. arc £11½ & £13½, inc. £1½; pr. 1½, 1 & ½ ; tr. 1	Flat rate & sliding scale	3,911,888	Lighting and traction. Data to Mar. 31, 1909 (part 1910). *4,000 KW. being installed	62	294 MELROSE .. ..
	..	650 KW.	42 KW.	Lg. 6 w. rebates, to 4½ ; pb. lg. arc £14, inc. £2; pr. 3 to 2½* w. dis.	Flat rate with discounts & special	354,743	*Corp. waterworks, 50 H.P., supplied at 1.25d. per unit average. Data to Mar. 31, 1912	63	295 MERTHYR TYDFIL ..
	..	1,108 KW.	..	Lg. 6, 7 & 3, 2; pb. lg. arc £20 p.a. ; pr. 2½ & 1½	Max. dem., fl. & 2-rate meter with dis., etc.	317,936	Lg. & tr. station. Max. load in Sep. ; load through season heavier than in winter. Data to Mar. 31, 1912	64	296 MEVAGISSEY .. ..
	20=500 H.P.	1,640 KW.	..	Lg. 7 & 4, or 6 ; pb. lg. contract ; pr. 4 & 1, or 2½ ; tr. 1½	Max. demand, flat rate & contract	2,258,865	Lighting and traction. *Also A.C. at 3,000 v. Tr. 520 v. D.C. Data to Dec. 31, 1911	65	297 MEXBOROUGH .. ..
	..	2,323 KW.	8 KW.	Lg. 6 on 200 v., 7 on 100 v., with spcl. discounts ; pr. 3½ to 1½	Flat rate with discounts, & contract	700,587	Data to May, 1912	66	298 MIDDLESBROUGH ..
	..	237 KW.	..	Lg. 4 ; pb. lg. 2 ; pr. 2	Flat rate	100,000 est.	*Also destructor, £7,000. Energy obtained from refuse almost entirely. Data to May 15, 1909	67	299 MIDDLETON .. ..
	..	1,263 KW.	53 KW.	Lg. 7 & 1½, or 4½ ; pb. lg. arc £20, inc. £3½ p.a.* ; pr. 1½	Max. demand and flat rate w. dis.	758,785	*Two tant. 23 C.P. each, or two Osram 25 C.P., or one cbn., 25 C.P. Data to Mar. 31, 1912.	68	300 MILFORD-ON-SEA ..
F.	..	9,235 KW.	737 KW.	Lg. 7 & 2, or 3½ ; pb. lg. arc £14, flame £20, p.a.† ; pr. 4 & 1, or 1½	Max. dem., flat rate, sl. sc., 2-rate mtr.	5,298,335 (approx.)	*Tr. dept. sup. 3-ph. 6600 v., 50~ & 400 v., D.C. at cost p.u. †Inc. £2 14s. £4 1s. & £6 p.a. Data 31/3/12	69	301 MINEHEAD AND DUNSTER
P.	80=450 H.P.	2,901 KW.	177 KW.	Lg. 5 to 3½*; pb. lg. arc £21 18s 4d & £15 ; pr. 1(restd. hrs. 3½); tr. 1.694	Max. demand, flat, sl. sc., 2 rate & spl.	2,317,495	Lighting and traction. *Also £7 per KW. m.d. & 2d. per unit. Data to Mar. 31, 1912	70	302 MIRFIELD .. ..
	..	117 KW. ..	..	Lg. 7½ w. dis. (=6 to 3½); pb. lg. contract	Flat rate with discounts	68,479	5 miles overhead mains to Carlow. Water power; steam plant at C. as stand-by	71	303 MONMOUTH .. ..
	..	494 KW.	129 KW.	Lg. 5 ; pr. 2½, w. discounts ..	Flat rate	132,989	*Leased from the Corporation. †2 years. Data to Mar. 25, 1912	72	304 MONTROSE .. ..
	..	543 KW. ..	57.8 KW.	Lg. 7 & 4, or 6 ; pr. 4 & 1½, or 2½	Flat rate and yearly contract.	119,900	Data to Dec. 31, 1911	73	305 MORECAMBE .. ..
	..	..	..	Lg. 6 ; pb. lg. inc. £2 p.a. ..	Flat rate	..	Water power. Data to April 13, 1910	74	306 MORLEY .. .. ..
	..	925 KW.	..	Lg. 5½ to 4½ ; pb lg. arc £25½, N. £3 3s. p.a. ; pr. 3	Sliding scale with discounts	509,787	*Res. Eng. & Manager, J. Eustace. Data to Dec. 31, 1909	75	307 MORPETH .. ..
	40=1,240 H.P.	2,223 KW. (ex. tr.)	..	Lg. 5½, 4 & 2 ; pb. lg. 3 ; pr. 2 ; tr. 1.6, 1.1, & 0.75	Max. demand, flat rate & contract	1,780,609 (estd.)	Lighting and traction. Lighting A.C., Tramway Co. supplied with D.C. Data to Mar. 31, 1910	76	308 MOTHERWELL .. ..
	..	..	..	Lg. 6 ; pr. 2½	Flat rate	37,559	Data to Dec. 31, 1911	77	309 MUSSELBURGH ..
	..	534 KW. ..	5.6*	Ches. 5, 6 & 3; Ches. Bois 6 ; pb. lg. contract ; pr. 4 & 1½, or 2	Flat rate, contract & max. demand	333,631	*To Dec. 31, 1911. Data to March 30, 1912	78	310 NELSON .. .. ..
P.	36=1,230 H.P.	3,497 KW.	..	Lg. 3½ ; pb. lg. inc. £5,005 p.a. ; pr.1½ & 1; tr. 0.89 p.u. + £982 p.a.	Max. demand, flat, sl. sc., 2 rate & spl.	2,317,495	Lighting and traction. Data to Mar. 23, 1910	79	311 NEWBURY .. ..
P.	80=760 H.P.	2,793 KW.	10.9%	Lg. 6 & 4, less 10% , or 3½ ; pb. lg. arc £12½ ; pr. 1½, 1½ & 1 ; tr. 1½	Max. demand with dis. & flat rate	1,430,540	Lighting and traction. Data to Mar. 31, 1912	80	312 NEWCASTLE-EMLYN & DISTRICT
	..	270 KW. ..	158 KW.	Lg. 6 ; pb. lg. £3½ p. lp. ; pr. 2½ & 1½ and 1½ & 2½ ; htg. 1½.	Flat rate	212,000	*Horace Boot, cons. eng. Diesel oil-engine plant. Data to Dec. 31, 1911.	81	313 NEWCASTLE-ON-TYNE
	..	504 KW. ..	..	Lg. 8 & 4, or 7 ; pr. 4	Max. demand and flat rate	121,974	*Bulk supply from Bromley at 2,000 v. Data to Dec. 31, 1909	82	314 NEWCASTLE-ON-TYNE
	..	1,482 KW.	..	Lg. 5 (shops 4) ; pr. 2 to 1½ ..	Flat rate with discounts	809,697	Data to Dec. 31, 1909	83	315 NEWCASTLE-ON-TYNE AND TYNESIDE
	..	64 KW. ..	..	Lg. 6 ; pr. 5 & 1½..	Flat rate	19,278	Suction gas plant	84	316 NEWCASTLE-UNDER-LYME
	..	..	..	Lg. 5 ; pr. 3	Flat rate	..	.. ..	85	317 NEWMARKET AND EXNING
P.	600 H.P. ..	980 KW.	..	Lg. 4 ; pb. lg. 2 ; pr. 2, 1, ½ & ¾* tr. 1.5 to 1.3	Flat rate & sliding scale	1,039,162	Lighting and traction. *102 H.P. under agreement at ¾d. per unit. Data to Mar. 31, 1912	86	318 NEWPORT & COWES
	..	2,948 KW.	..	Lg. 4	Flat rate & sliding scale	2,052,875	Lg. & tr. *Traction 550 v. D.C. †Part of supply bulk from Clyde Valley Elec. Power Co. Data to Dec. 31, 1909	87	319 NEWPORT (MON.) ..
	36=544 KW.	2,663 KW.	307 KW.	Lg. 5 to 3½ ; pb. lg. 2.11 ; pr. 4 to 1 ; tr. 1½	Flat rate with discounts	1,497,425	Lighting and traction. Data to Mar. 31, 1912	88	320 NEWQUAY .. ..
	24=672 H.P.	1,495 KW.	6.4%	Lg. 6 & 2½, or 4½ ; pr. 3 & 1, or 2½ ; tr. 2 to 1½	Max. demand and flat rate	765,769	Lighting and traction. Motor-gen. 125 K.V.A., 50~, 3-ph., for transmission. Data to Mar. 31, 1912	89	321 NEWTON ABBOT ..
	..	683 KW.	6 KW.	Lg. 5; pb. lg. 4 ; pr. 3	Flat rate	276,129	Data to Mar. 31, 1912	90	322 NORTHALLERTON ..
	70=1,330 H.P.	4,638 KW.	..	Lg. 5, 4 & 3; pb. lg. arc £15 p.a. ; pr. 2 & 1½	Flat rate determined by max. demand	3,595,303	Lighting and traction. *6,000 v. 50~ 3-ph. trans. †Lg. £155,544 ; tr. £173,466. Data to Dec. 31, 1909	91	323 NORTHAMPTON .. ..
	..	9,564 KW.	1.694 KW.	Lg. 6, 3 & 1, or 4½ ; pr. 1½ to ⅔ ; pb. lg. £800 p.a	Max. demand and flat rate	10,473,339	Data to Mar. 31, 1912	92	324 NORTHWICH .. ..
	..	60 KW.	10 KW.	Lg. 6 ; pr. 4	Flat rate	50,000	Suction gas plant, and overhead mains	93	325 NORWICH .. .. ..
	..	1,205 KW.	18.9%	Lg. 6 & 3, or 4 ; pb. lg. 2½ ; pr. 2 to 1	Max. dem., flat & sl. scale with dis.	700,103	Data to Mar. 31, 1912	94	326 NOTTINGHAM .. ..
	..	471 KW.	23 KW.	Lg. 7 & 4, or 6* ; pb. lg. arc £17 p.a. ; pr. 4 & 1½, or 2½	Max. demand and flat rate	104,627	*Slot meter 7d. per unit, inc. meter rent. Data to Dec. 31, 1911	95	327 NUNEATON .. ..
P.	220=5,604 H.P.	12,765 KW.	218 KW.	Lg. 7 & 1½, or 3½ (bsmnt 2½) ; pr. (t. sw.) 2½ & 1, or 2½ ; tr. 2 to 1.†	Max. dem., flat, cont. w. dis., time sw.	6,471,202	Lg. & tr. *230 & 460 D.C., tr. 550 v. †Pb. lg. arc £14; inc. £3 7s. and £2 18s. 4d. p.a. Htg., 1½d. Data to Mar. 31, 1912	96	328 OBAN .. .. ..
	..	200 KW. ..	..	Lg. 4½ less 10 % ; pb. lg. 3; pr. 3 ; hg. 1½	Flat rate	73,513	*Resident Engineer, J. A. Gow-Russell. Data to Dec. 31, 1909	97	329 OCKORE VALLEY ..
P.	32=800 H.P.	3,822 KW.	..	Lg. 4 & 1½, or 3½ ; pb. lg. arc £15 p.a. ; pr. 1½ to 1* ; tr. 1	Flat rate, max. demand & sl. scale	1,894,676	Lighting and traction. *Also £4 per KW. p.a., and ½d. per unit. Data to Mar. 31, 1910	98	330 OLDHAM .. .. ..
P.	12=600 H.P.	1,455 KW.	..	Lg. 7 & 2, or 4* (arc 3) ; pb. lg. arc £15 & £10† ; pr. 2½ to 1½ ; tr. 1½ to 1	Max. demand and flat rate w. dis.	1,186,132	Lg. & tr. *Prept. meters, 6d. †Mtl. £4 & £3 3s. ‡Also £5 per KW. & 1½ p.u. (1 p.u. over 150,000). Data to Mar. 31, '12	99	331 OSWESTRY .. ..
	..	809 KW.	27 KW.	Lg. 7 & 3, or 6 ; pb. lg. £618 p.a. ; pr. 4 & 1½, or 2½	Max. demand and flat rate	808,928	Data to Dec. 31, 1911	100	332 OULTON BROAD ..
P.	32=1,120 H.P.	1,692 KW.	..	Lg. 4½ ; pb. lg. 3; pr. 2 to ⅔ ; tr. 1⅓	Flat rate and contract	917,506	Lt. & tr., with destructor. *Traction 500 v. Data to Mar. 31, 1912 Adding 1,000-KW. turbo-gen. 3,000 v. 50~	101	333 OXFORD .. .. ..
	..	18 KW.	..	Lg. 4, minimum £1 p.a. ; pb. lg. 3; pr. 2½ & 2, min. £2 p.a.	Flat rate	9,371	Data to April 29, 1912	102	334 PAIGNTON .. ..
P.	98=2,000 H.P.	8,000 KW.	450 KW.	Lg. 6 to 2½ ; pb. lg. inc. 2 ; pr. 3 to 1 ; tr. 1.45	Max. demand and sliding scale*	6,100,000	Lg. & tr. *Special max. demand rates for lg. and pr. ; p. lg., arc £32 (4nt. £10). Data to May, 1912	103	335 PAISLEY .. .. ..
	92=3,220 H.P.	3,836 KW.	..	Lg. 3½* ; pb. lg. arc £22½, inc. £3½ ; pr. 1½ ; tr. 3 to 1.25	Fl., max. dem., sl. sc., 2-r., cont., t. sw., spl.	1,934,688	Lighting and traction. *By 2-rate mtr., 3½ & 1¾d. Data to Mar. 31, 1912	104	336 PARTICK .. .. ..
P.	28=740 H.P.	1,820 KW. tr. 500 KW.	..	Lg. 5½ & 3, or 4 ; pb. lg. 5½ & 3 ; pr. 2½ & ⅔ ; tr. 1.6, 1.5 & 1.4	Max. demand and flat rate with dis.	1,419,959	Traction supply to Yorks. (W.D.) Elec. Trys., and to Dewsbury & Ossett Trys. Data to Mar. 31, 1912	105	337 PEMBERTON .. ..
	..	45 KW. ..	..	Lg. 8 & 6 ; pr. 6 to 3	Max. demand and flat rate	..	Gas power	106	338 PEMBROKE (DUBLIN) ..
	..	63 KW.	..	Lg. 6; pb. lg. 3 ; pr. 3 ; hg. 1½	Flat rate & sliding scale	15,874	Overhead mains, bare copper. *Resident engineer, J. B. Mitchell. Data to Dec. 31, 1909	107	339 PENARTH .. ..
	50=1,250 H.P.	2,370 KW.	133 KW.	Lg. 5, 4½ & 3 ; pb. lg. £230 p.a. ; pr. 2 to 1 ; tr. 1½	Max. demand and flat rate	1,250,231	Lighting and traction. Data to Mar. 31, 1912	108	340 PENRITH .. ..
	..	578 KW.	..	Lg. 7 & 4, or 6 ; pr. 2½	Max. demand & flat rate	131,692	Data to Dec. 31, 1909	109	341 PERTH .. .. ..
	21=1,100 H.P.	2,963 KW.	..	Lg. 7 & 3, or 6½ w. dis.* ; pr. 2½ ; tr. 2½	Max. demand & flat rate w. discount	1,009,379	Lighting and traction. *Pb. lg. arc £30 p.a., or 2¾d. p.u., inc. (13 C.P.) £1 12s. p.a. Data to Mar. 31, 1910	110	342 PETERBOROUGH ..
P.	..	6,783 KW.	..	Lg. 5½ to 3 ; pb. lg. arc £22, inc. £3½ p.a. ; pr. 1½	Flat rate with discounts	3,875,675	Data to Dec. 1908	111	343 PLYMOUTH .. ..
P.	See other Table	1,790 KW. (ex. tr.) 72 KW.	..	Lg. 9½ to 3½ ; pr. 1 to 1½ ; tr. 1.12	Flat rate	2,173,117	Lighting and traction. *Being changed to metal. Data to Mar. 31, 1911	112	344 PONTYPOOL .. ..
	..	..	..	Lg. 6 ; pb. lg. £35 ; pr. 4 to 1 ..	Flat rate & sliding scale	19,200	Data to Sept. 30, 1909..	113	345 PONTYPRIDD .. ..
	60=1,620 H.P.	800 KW. (ex. tr.)	..	Lg. 4½ ; pr. spl. ; hg. 1½ ; tr. sl. scale	Max. demand, flat rate & sl. scale.	1,449,193	Lighting and traction station. *Resident engineer, A. B. Howden. Data to Dec. 31, 1909	114	346 PORLOCK .. ..
	..	137 KW.	..	Lg. 7 ; pr. 3	Flat rate, with discounts	26,934	*W. H. Scott, resident. Data to Dec. 31, 1909	115	347 PORTPATRICK ..
	144=3,580 H.P.	15,239 KW.	1,090 KW.	Lg. 9½ to 2 ; pb. lg. arc £15, £12 £8 p.a. ; pr. 2½ to ⅔ ; tr. 1½†	Flat rate with dis. ; spl. m.d. for pr.	4,719,085	Lighting and traction. *Tr. 550 v. †Htg. 1½d. to ¾d. Data to April 30, 1912	116	348 PORTSMOUTH ..
	.	4,197 KW.	..	Lg. 4½ (arc 4), or 7 & 2½ ; pb. lg. arc £18 14s., inc. £3 1s.* ; pr. 1½	Flat rate & max. demand	1,443,770	*Osram lamps supplied free for pb. lg. Decrease in units sold due to mil. [illegible]	117	

101	DARWEN	Darwen Corporation	1899	Claud. Garnett	230 & 460 D.C. 500 & 440 A.C.*	50—, 3-ph., & direct	900	750	117 KW.	£64,000	772 KW.	20 arc, 4 cbn., 185 mtl.	210=1,024 H.P.	62=1,120 H.P.	1,6
102	DENNY AND DUNIPACE	Denny and Dunipace Corporation	1908	Andrew G. Merriles	230 & 460	50—, 3-ph.	..	..	..	£1,077	10 KW.	88 mtl. ..	1=5 H.P. ..	..	1
103	DERBY	Derby Corporation	1893	T. P. Wilmshurst	380 & 460 D.C. 200 A.C. tr. 500	40—, 1-ph. & direct	5,750	3,100	375 A.	£327,000	5,000 KW.	186 arc, 518 cbn.	220=3,500 H.P.	98=2,000 H.P.	8,0
104	DEVONPORT	Devonport Corporation	1901 tr. 1902 lg.	J. W. Spark	220, 430 & 500	Direct	1,800	1,308	670 A. lg., 1,000 A. tr.	£128,355	1,124 KW.	20 arc, 1 inc.	74=456 H.P.	92=3,220 H.P.	3,8
105	DEWSBURY	Dewsbury Corporation	1894	R. H. Campion	220 & 440, tr. 550	Direct	1,320	1,012	360 A.H.lg., 150 KW.tr.	£30,458	1,023 KW.	81 arc, 32 cbn., 7 mtl.	303=1,030 H.P.	28=740 H.P.	1,8 tr.
106	DISS	Suffolk Electricity Supply Co., Ltd.	1898	Napier Prentice	200	Direct	48	28	40 KW.	..	40 KW.	..	5=8 H.P. ..	..	45
107	DOLLAR	Electric Supply Corporation, Ltd.	1904	K. A. Scott-Moncrieff*	225	Direct	40	17.1	15 KW.	£7,000	64 KW.	26 mtl., 8 Nernst	5=1½ H.P. ..	..	6
108	DONCASTER	Doncaster Corporation	1900	E. S. Rayner	230 & 460 tr. 500	Direct	1,700	950	75 KW.	£70,560	1,100 KW.	8 arc, 44 mtl.	85=420 H.P.	50=1,250 H.P.	2,3
109	DORKING	Dorking Electricity Supply	1904	Henry Joseph	240	Direct	160	163	49 KW.	£38,599	520 KW.	..	53 KW. (inc. htg.)	..	57
110	DOVER	Dover Corporation	1895	L. W. Woodman	100 & 200 A.C. 530 D.C.	100—, 1-ph. & direct	1,950	691	77 KW.	£187,194	1,568 KW.	65 arc; inc. & N. = 444 8-C.P.	49=244 H.P.	21=1,100 H.P.	2,5
111	DUBLIN	Dublin Corporation	1892	Mark Ruddle	lg. 200, pr. 346	50—, 1-ph. & 3-ph.	6,000	3,490	..	£526,000	4,944 KW.	557 arc, 125 mtl.	334=1,670 H.P.	..	6,7
112	DUDLEY	Dudley Corporation	1899	Charles E. Savage	230 & 460 tr. 500	Direct	1,600	..	530 KW.	£93,600	1,100 KW.	56 arc,* 222 cbn.,* 30 mtl.	117=1,557 H.P.	See other Table	1,7
113	DULVERTON	Dulverton Electric Lighting Co., Ltd.	1904	J. P. Davis (Res.)	230	Direct	60	30	50 KW.	£3,780	62 KW.	35 cbn. ..	8=12 H.P.	..	7
114	DUMBARTON	Electric Supply Corporation, Ltd.	1906	K. A. Scott-Moncrieff*	240 & 480 tr. 500	Direct	940	763	50 KW.	£43,480	191 KW.	..	69=685 H.P.	60=1,620 H.P.	80 (e
115	DUMFRIES	Dumfries Electric Supply Co., Ltd.	1906	Talfourd Ely, Manager*	250	Direct	200	52	125 KW.	£31,536	90 KW.	..	35=50 H.P.	..	13
116	DUNDEE	Dundee Corporation	1893	H. Richardson	200 & 400 D.C. 6,200 A.C.*	50—, 3-ph. & direct	6,500	3,087	140 KW.	£238,861	5,204 KW.	110 arc, 22 mtl.	797=3,402 KW.	144=3,580 H.P.	15,2
117	EALING	Ealing Corporation	1894	J. Douglas Knight	102 & 204	40—, 1-ph.	1,770	1,133	94 KW.	£205,853	..	72 arc, 804 mtl.	57=196 H.P.	.	4,1
118	EASTBOURNE	Eastbourne Corporation	1882 & 1900*	J. K. Brydges	200	50—, 1-ph.	1,950	1,350	..	£195,822	3,524 KW.	97 arc, 60 mtl.	155=485 H.P.	..	3,9
119	EAST HAM	East Ham Corporation	1901	W. C. Ullmann	240 & 480 tr. 500	Direct	1,925	1,627	..	£128,993	2,016 KW.	202 arc, 111 mtl.	142=528 H.P.	90=2,250 H.P.	4,2
120	EBBW VALE	Ebbw Vale Urban District Council	1906	Wm. Horsfall*	230 & 460	Direct	Bulk supply†	212	..	£16,252	396 KW.	983 mtl. ..	18=87 H.P.	..	47
121	ECCLES	Eccles Corporation	1898	H. W. Angus	200 A.C., tr. 500 D.C.	50—, 1-ph.	910	277 KW. lg., 111 KW. tr.	tr. 150 KW.	£48,413	540 KW.	27 arc, 303 posts	47=196 H.P.	..	79 (e
122	EDGWARE	North Metropolitan Electric Power Supply Co.	1911	N. E. North* (Res.)	240 & 415	50—, 3-ph.	50	7	..	£5,027	6 KW.	..	..	..	10
123	EDINBURGH	Edinburgh Corporation	1895	F. A. Newington	230 A.C., 230 & 460 D.C.	50—, 1-ph. & direct	15,217	11,436	3,600 A.H.	£1,042,855	23,388 KW.	1,219 arc, 1,115 cbn., 24 mtl.	2,585=11,408 H.P.	..	33,
124	EDMONTON	North Metropolitan Electric Power Supply Co.	1907	C. J. Barnett* (Res.)	240 & 415	50—, 3-ph.	550 (trans.)	245	..	£23,299	257 KW.	27 flame arc, 5 mtl.	50=448 H.P.	..	709
125	ECHAM AND STAINES	Egham & Staines Electricity Co., Ltd.	1912	F. L. Strickland	100	50—, 1-ph.	200	22	..	.. ..	43 KW.	2 mtl. ..	1=2 H.P. ..	..	4
126	ELLAND	Elland Urban District Council	1908	Wm. C. Knowles	240 & 480	Direct	280	155	75 KW.	£19,716	469 KW.	24 arc, 5 cbn., 63 mtl.	58=243 H.P.	..	65
127	ENFIELD	North Metropolitan Electrical Power Distribution Co., Ltd.	1906	A. H. Bennett* (Res.)	240 & 480	Direct	†	164	..	£21,591	347 KW.	..	33=153 KW.	..	50
128	EPSOM	Epsom Urban District Council	1902	A. C. Gilling	230 & 460	Direct	560	209	87 KW.	£40,015	16,679 KW.	14 arc, 97 cbn., 823 mtl.	80=75 H.P.	..	51
129	ERITH & DISTRICT	Erith Urban District Council	1903	A. Coveney	350, 400 & 200 tr. 500 D.C.	50—3 & 1-ph.	1,350	830	..	£67,835*	913 KW.	19 arc, 511 cbn., 94 N.	110=803 H.P.	34=950 H.P.	2,15
130	EXETER & HEAVITREE	Exeter Corporation	1889*	H. D. Munro	100 A.C., tr. 500 D.C.	60—, 1 & 2 ph.	1,500	957	..	£111,698	1,830 KW.	47 arc, 527 mtl.	175=600 H.P.	40=1,000 H.P.	2,32
131	EXMOUTH	Electric Supply Corporation, Ltd.	1904	K. A. Scott-Moncrieff*	225 & 450	Direct	300	69	80 KW.	£28,250	234 KW.	..	14=47 H.P.	..	341
132	FALKIRK	Falkirk Corporation	1903	J. McMillan	230 & 460	50—, 3-ph. & direct	500	222	150 KW.	£35,000	684 KW.	51 arc, 100 mtl., 10 N.	96=688 H.P.	..	80,2
133	FALMOUTH	Electric Supply Corporation, Ltd.	1906	K. A. Scott-Moncrieff*	240 & 480	Direct	300	102	85 KW.	£29,270	205 KW.	..	18=28½ H.P.	..	319
134	FAREHAM	Fareham Urban District Council	1890	A. Blake	105	125—, 1-ph.	135	85	..	£12,988	168 KW.	37 arc, 111 cbn., 9 mtl.	2=½ H.P. ..	..	186
135	FARNWORTH	Farnworth Urban District Council	1901	A. J. Hutchinson	220 & 440 tr. 500	Direct & 50—, 3-ph.	550	520	180 A.	£49,365	462 KW.	133 arc, 136 inc.	619 H.P. ..	24=600 H.P.	1,480
136	FAVERSHAM	Faversham Corporation	1904	G. Sommerville	230 & 460	Direct	270	110	46 KW.	£22,442	150 KW.	10 arc, 8 cbn., 20 mtl., 100 N.	10=30 H.P.	..	200
137	FELIXSTOWE & WALTON	Suffolk Electricity Supply Co., Ltd.*	1899	Napier Prentice	200	Direct	200	165	100 KW.	..	300 KW.	40 arc, 10 mtl.	15=22 H.P.	..	350
139	FINCHLEY	Finchley Urban District Council	1903	Edward Calvert	250 & 500	Direct	1,750	872	200 KW.	£119,816	2,709 KW.	133 cbn., 899 mtl.	81=330 H.P.	..	3,909
140	FLADBURY	Fladbury Electric Light and Power Co., Ltd.	1900	J. Wm. Wagstaff	220	Direct	40	..	..	..	..	189 inc. ..	1=4 H.P. ..	..	.
141	FLEETWOOD	Fleetwood Urban District Council	1900	W. H. Miller	200 & 400	Direct	645	396	88 KW.	£27,897	780 KW.	1,080 mtl., 50 C.P. equiv.	634 H.P. ..	..	1,227
142	FOLKESTONE	Folkestone Electricity Supply Co., Ltd.	1898	T. Hesketh	210 & 420	Direct	2,250	1,211	..	£218,715	..	88 arc, 455 mtl.	..	..	4,09
143	FOLKESTONE AND DISTRICT	Folkestone District Electric Light & Power Co., Ltd.	1899	W. G. F. Webster	110	Direct	100	50	10 KW.	£6,000	50 KW.	..	7=15 H.P.	..	217
144	FORT WILLIAM	Fort William Electric Lighting Co., Ltd.	1896	I. Reid	150 & 300	Direct	120	120	36 KW.	£11,001	200 KW.	6 arc, 60 inc.	2=4 H.P. ..	..	210
145	FRINTON-ON-SEA	Frinton-on-Sea & District Electric Light & Power Co., Ltd.	1903	A. F. M. Gatrill	200 & 400	Direct	193	108	28 KW.	.. ..	..	..	2=8 H.P. ..	..	.
146	FROME	Frome Electricity Supply	1904	F. H. Merritt	240 & 480	Direct	525	362	65 KW.	£54,606	257 KW.	10 arc, 202 mtl.	224=1,137 H.P.	..	1,320
147	GALWAY	Galway Electric Co., Ltd.	1889	Fred. Swarbrick (Eng. & Man.)	120	Direct	120	120	90 KW.	£15,897	212 KW.	20 arc, 16 cbn., 50 mtl.	8=28.5 H.P.	..	282
148	CATESHEAD, DURHAM, JARROW, ETC.	County of Durham Electrical Pr. Distribution Co., Ltd.	1901	†	240 & 480 D.C. 440 A.C.; tr. 500	40—, 3-ph. and direct	†	..	..	£435,966	2,224 KW.	..	15,500 KW. (inc. pr. & hg.)	3,777 KW. tr. 250 KW.	21,86
149	GILLINGHAM	Gillingham Corporation	1906	A. D. Chalmers	230 D.C., 230 & 100 A.C.*	Direct & 50—, 3-ph.	1,095	514	..	£31,908†	678 KW.	770 mtl. ..	86=97 H.P.	..	1,200
150	GLASGOW	Glasgow Corporation	1892	W. W. Lackie	250 & 500	Direct	37,478	28,594	600 KW.	£1,889,715	29,898 KW.	887 arc, 24 mtl	5,875=36,831 H.P.	..	56,81
151	GLOSSOP	Urban Electric Supply Co., Ltd.	1903	C. E. Knowles	240 & 480	Direct	495	312	60 KW.	£52,2 8	339 KW.	49 mtl.	66=264 H.P.	16=480 H.P.	950
152	GLOUCESTER	Gloucester Corporation	1900	F. H. Corson	220 & 440, tr. 500-550	Direct	2,000	1,252	200 KW.	£90,315	2,410 KW. (inc. pr.)	175 arc, 14 mtl.	..	60=2,100 H.P.	4,400 K
153	GODALMING	Urban Electric Supply Co., Ltd.	1902	R. S. Robertson	240 & 480	Direct	320	254	45 KW.	£57,943	906 KW.	10 300 w., 353 100 55 w. mtl.	158 KW. pr. & htg.	65 H.P. ..	1,06
154	GORING & STREATLEY	Goring & Streatley Electric Light Co., Ltd.	1897	T. Gillies	100 & 210	Direct	80	85	11 KW.	..	60 KW.	..	6=12 H.P. ..	..	.
155	GORSEINON	Gorseinon Electric Light Co., Ltd.	1894	D. Powell	200	Direct	60	55	190 KW.	£4,800	260 KW.	60 inc. ..	9=48 H.P. ..	..	300 K
156	GOSPORT & ALVERSTOKE	Gosport & Alverstoke Electric Lighting Co., Ltd.	1907	J. Fereday Glenn	240 & 480	Direct	400*	..	..	..	167.4 KW.	..	7=23.64 H.P.	..	185 K
157	GOVAN	Govan Corporation	1900	T. C. Parsons	250 & 500	Direct	2,950	2,117	225 KW.	£143,393	1,880 KW.	215 arc ..	6,627 H.P. ..	..	7,508
158	GRANTHAM	Urban Electric Supply Co., Ltd.	1903	J. E. Edmundson	240 & 480	Direct	320	220	650 A.H.	£35,372	332 KW.	..	412 KW. ..	..	1,294
159	GRASSINGTON	Grassington Electric Supply Co., Ltd.	1909	John Banks	..	Direct	20	12	..	£350 (about)	15 KW.	26 mtl. ..	1=½ H.P. ..	..	15 KW
160	GRAVESEND	Gravesend Corporation	1902	C. F. McInnes	220	Direct	1,050	684	680 A.H.	£39,549	..	..	..	36=900 H.P.	948 K
161	GRAYS THURROCK	Grays Thurrock Urban District Council	1901	E. D. Long	230 & 460	Direct	320	160	97 KW.	£23,680	330 KW.	201 inc., 45 N., 19 mtl.	94=72 H.P.	..	437 K
162	GREAT CROSBY AND WATERLOO	Liverpool District Lighting Co., Ltd.	1897	Oswin Hansom	220 & 440	Direct	650	295	160 A.	£62,894	..	103 mtl. ..	15=55 H.P.	..	2,000
163	GREENOCK	Greenock Corporation	1899	J. A. Robertson	250 & 500 D.C. 110 & 230 A.C.*	50—, 3-ph. and direct	6,900	4,505	864 KW.	£220,000†	2,340 KW.†	50 arc, 2 mtl.	755=2,635† H.P.	82=2,250 H.P.	10,05
164	GREYSTONES	Greystones Electric Light & Power Co., Ltd.	1910	Raymond F. Fry	100	50—, 1-ph.	60	22	..	£3,500	55 KW.	41 mtl. ..	..	..	55 KW
165	GRIMSBY & DISTRICT	Grimsby Corporation	1901	W. A. Vignoles	230 & 460	Direct	1,716	1,557	..	£102,317	2,041 KW.	94 arc, 6 cbn., 476 mtl.	208=1,500 H.P.	Max. dem. = 952 KW.	3,468 (ex.
166	GUERNSEY	Guernsey Electric Light and Power Co., Ltd.	1900	A. N. Eye	210 & 420	Direct	1,340	932	600 KW.	£140,608	966 KW.	21 mtl. ..	2,585 KW. ..	..	3,551
167	GUILDFORD	Guildford Electricity Supply Co., Ltd.	1896	H. L. Alderton	230 & 440 D.C. 220 A.C.	Direct & 50—, 1-ph.	750	417	220 KW.	£66,180	..	9 arc, 9 mtl.	106=562 H.P.	..	*
168	HALIFAX	Halifax Corporation	1894	W. M. Rogerson	230 & 460 D.C. 230 & 400 A.C.*	50—, 3-ph. and direct	5,100	3,094	630 KW.	£259,547	3,658 KW.	70 arc, 194 mtl.	615=2,894 H.P.	See other Table.	6,197
169	HAMILTON	Edmundson's Electricity Corporation (Lessees)	1908	G. Salter	240 & 480	Direct	780	553	150 KW.	£39,776	569 KW.	66 arc, 8 N. 1	49=1,051 H.P.	..	1,757
170	HANLEY, STOKE-ON-TRENT	County Borough of Stoke-on-Trent	1894	C. H. Yeaman	100, 200 & 400	100—, 1-ph.	1,900	1,346	..	£128,908	2, 946 KW.	77 arc, 594 inc.	1,798 KW. ..	..	3,678
171	HARROGATE	Harrogate Corporation	1897	G. Wilkinson	200 & 100	50—, 1-ph.	2,150	800	..	£126,270	1,960 KW. htg. 264	1 arc, 705 mtl.	155=699 H.P.	..	2,729
172	HARROW	Harrow Electric Light and Power Co., Ltd.	1898	J. A. B. Horsley	220 & 440	Direct	854	385	77 KW.	£95,174	1,091 KW. (inc. motors)	..	..	..	1,213
173	HASTINGS	Hastings Corporation	1893	R. F. Ferguson	220 & 400	100—, 1-ph.	1,750	872	80 KW.	£178,797	1,168 KW.	115 arc, 561 mtl.	61=208 H.P.	..	1,425
174	HAWICK	Urban Electric Supply Co., Ltd.	1901	Henry Joseph	240 & 480	Direct	1,980	943	80 KW.	£80,250	680 KW.	12 arc, 12 cbn., 475 mtl.	208=1,661 H.P.	..	2,221
175	HEBBURN & FELLING	Northern Counties Elec. Sply. Co., Ltd. (Owned by U.D.C.)	1903	J. Webber and W. R. Rogers	220 & 460 D.C. 440 A.C.	Direct & A.C.	3,400*	F. 625	..	..	235 KW.	25 KW. ..	3,400 KW. (inc. pr. & htg.)	..	3,600
176	HEBDEN BRIDGE	Hebden Bridge Urban District Council	1904	J. W. Garside	210 & 480	Direct	215	125	48 KW.	£12,250	160 KW.	52 mtl. ..	29=115 H.P.	..	167 K
177	HECKMONDWIKE	Heckmondwike Urban District Council	1903	Geo. H. Carter	220 & 460	Direct	320	1,117	300 KW.	£41,497	379 KW.	10 arc, 149	131=1,123	400 KW.	1,977

H.P.	82=1,120 H.P.	1,692 KW.	..	Lg. 4½; pb. lg. 3; pr. 2 to 3; tr. 1.5	Flat rate and contract	917,508	IA & tr., with destructor. *Traction 500 v. Data to Mar. 31, 1912 Adding 1,000-KW. turbo-gen. 3,000 v. 50~	101
..	..	18 KW.	..	Lg. 4, minimum £1 p.a.; pb. lg. 3; pr. 2½ & 2, min. £2 p.a.	Flat rate	9,371	Data to April 29, 1912	102
H.P.	98=2,000 H.P.	3,000 KW.	450 KW.	Lg. 6 to 2½; pb. lg. inc. 2; pr. 3 to 1; tr. 1.45	Max. demand and sliding scale*	6,100,000	Lg. & tr. *Special max. demand rates for lg. and pr.; pb. lg., arc £23 (¼nt. £10). Data to May, 1912	103
H.P.	92=3,220 H.P.	3,836 KW.	..	Lg. 3½*; pb. lg. arc £22½, inc. £3½; pr. 1½; tr. 3 to 1.25	Fl., max. dem., sl. sc., 3-r., cont., t. sw., spl.	1,934,688	Lighting and traction. *By 2-rate mtr., 3½ & 1¾d. Data to Mar. 31, 1912	104
H.P.	28=740 H.P.	1,820 KW. tr. 500 KW.	..	Lg. 5½ & 3, or 4; pb.lg. 5½ & 3; pr. 2½ & ½; tr. 1.6, 1.5 & 1.4	Max. demand and flat rate with dis.	1,419,959	Traction supply to Yorks. (W.D.) Elec. Trys., and to Dewsbury & Ossett Trys. Data to Mar. 31, 1912	105
..	..	45 KW. ..	..	Lg. 8 & 6; pr. 6 to 3	Max. demand and flat rate	..	Gas power	106
..	..	66 KW. ..	..	Lg. 6; pb. lg. 3; pr. 3; hg. 1½	Flat rate & sliding scale	15,874	Overhead mains, bare copper. *Resident engineer, J. B. Mitchell. Data to Dec. 31, 1909	107
.P.	50=1,250 H.P.	2,370 KW.	133 KW.	Lg. 5, 4½ & 3; pb. lg. £230 p.a.; pr. 2 to 1; tr. 1½	Max. demand and flat rate	1,250,231	Lighting and traction. Data to Mar. 31, 1912	108
ne.	..	573 KW. ..	..	Lg. 7 & 4, or 6; pr. 2½	Max. demand & flat rate	131,692	Data to Dec. 31, 1909	109
.P.	21=1,100 H.P.	2,963 KW. ..	..	Lg. 7 & 3, or 6½ w. dis.*; pr. 2½; tr. 3½	Max. demand & flat rate w. discount	1,099,279	Lighting and traction. *Pb. lg. arc £30 p.a., or 2¾d. p.u., inc. (13 c.p.) £1 12s. p.a. Data to Mar. 31, 1910	110
H.P.	..	6,788 KW. ..	..	Lg. 5½ to 3; pb. lg. arc £22, inc. £3½ p.a.; pr. 1¼	Flat rate with discounts	3,875,675	Data to Dec. 1908	111
H.P.	See other Table	1,790 KW. (ex. tr.)	..	Lg. 3½ to 3; pr. 1 to 1½; tr. 1.12	Flat rate	2,172,117	Lighting and traction. *Being changed to metal. Data to Mar. 31, 1911	112
.	..	72 KW. ..	..	Lg. 6; pb. lg. £35; pr. 4 to 1 ..	Flat rate & sliding scale	19,200	Data to Sept. 30, 1909..	113
.P.	60=1,620 H.P.	800 KW. (ex. tr.)	..	Lg. 4½; pr. spl.; hg. 1½; tr. sl. scale	Max. demand, flat rate & sl. scale.	1,449,193	Lighting and traction station. *Resident engineer, A. R. Howden. Data to Dec. 31, 1909	114
P.	..	197 KW. ..	..	Lg. 7; pr. 3	Flat rate, with discounts	26,984	*W. H. Scott, resident. Data to Dec. 31, 1909	115
KW.	144=3,580 H.P.	15,239 KW.	1,090 KW.	Lg. 3½ to 2; pb. lg. arc £15, £12 £8 p.a.; pr. 2½ to ½; tr. 1½†	Flat rate with dis.; spl. m.d. for pr.	4,719,085	Lighting and traction. *Tr. 550 v. †Htg. 1½d. to ¾d. Data to April 30, 1912	116
P.	.	4,197 KW. ..	..	Lg. 4½ (arc 4), or 7 & 2; pb. lg. arc £18 14s., inc. £2/1/8*; pr. 1½	Flat rate & max. demand	1,443,770	*Osram lamps supplied free for pb. lg. Decrease in units sold due to mtl. lamps. Data to Mar. 31, 1910	117
M.P.	..	3,949 KW.	260 KW.	Lg. 5, hotels 7 & 2½† (arc 4); pb. lg. arc £20 3s. p.a.; pr. 2½ to 1; htg. 1½	Flat rate, max. demand, & 2-rate mtr.	1,493,328	*Purchased from Company in 1900. †Also double tariff, 5d. night, 2½d. day. Data to Mar. 31, 1912	118
M.P.	90=2,250 H.P.	4,225 KW.	275 KW.	Lg. 5 & 2, or 3½; pb. lg. arc £18, inc. £3 13/6; pr. 2 to 1; tr. 1.25	Max. dem., flat, w. dis., sl. scale, cont.	3,440,197	Lighting and traction. Data to Mar. 31, 1911	119
P.	..	478 KW.	293 KW	Lg. 4½ (slot meters 5); pb. lg. £2 p. lp. p.a ; pr. 2½ to 3½	Flat rate, sl. scale & contract	232,343	*R. P. Wilson, Cons. eng. †Bulk supply from Ebbw Vale Steel, Iron & Coal Co. Data to Mar. 31, 1912	120
.P.	..	795 KW. (ex. tr.)	..	Lg. 7 & 2, or 4; pb. lg. 1¾; pr. 2½ to 1; tr. 1½ to 1	Max. dem., flat, sl. sc.,2-rate mtr. & cont.	1,050,034	Lighting and traction. Tramways leased to Salford Corporation. Data to March 31, 1909	121
	..	10.5 KW. ..	..	Lg. 7 & 2, or 5; pb. lg. £4 & £2½; pr. 4 or 3 & 1	Max. demand & flat rate	3,645	*Engineer-in-Chief, E. T. R. Murray. Data to Dec. 31, 1911	122
408	..	33,371 KW.	1,703 KW.	Lg. 2½ w. dis. to 25%; pb. lg. arc £9, inc. £1 to £2 1s., pr. 1½ to ¾†	Flat rate (with discount for lg. only)	16,228,906	*Tr. 1¼d. Data to May 15, 1911	123
.P.	..	709.5 KW.	176.5 KW.	Lg. 6 & 2, or 4½ less 10%; pb.lg. arc £19½ p.a.; pr. 4 or 3, & 1; htg. 3 & 1	Max. demand, flat rate & contract	515,154	*Eng.-in-Chief, E. T. R. Murray. Data to Dec. 31, 1911	124
..	..	47 KW. ..	..	Lg. 6 or 2 & 7; pr. 2 & 7 ..	Flat rate, 2-rate meter, & t. switch	..	Supply commenced March, 1912. Data to May 11, 1912	125
.P.	..	650 KW.	75 KW.	Lg. 4; pb. lg. 1.8; pr. 2 to 1 ..	Flat rate, special & sl. scale	218,400	Data to Mar. 31, 1912	126
W.	..	500 KW.	114 KW.	Lg. 7 & 2, or 4½; pr. 4 & 1 (ex. peak 1½); htg. 2	Max. demand & flat rate	187,671	*Eng. in chief, E. T. R. Murray. †Bulk supply from North Metropolitan E.P.S. Co. Data to Dec. 31, 1911	127
..	..	515 KW. ..	..	Lg. 5½ (arc lg. 4); pb. lg. arc £17½ p.a.*; pr. 2½	Flat rate	212,517	*Tantalum, £5; inc., £3½ p.a. Data to Mar. 31, 1910 ..	128
.P.	34=850 H.P.	2,150 KW. ..	..	Lg. 7 & 2, or 4½ (arc. 2½); pb. lg., arc £20, p.a.; pr. 2 to 1½; tr. 1½	Max. dem., flat, sl. sc., 2-rate, w. dis., t. sw.	1,488,999	Lg. and tr. *Elec. £12,114 for tramway plant. †Inc. (2 × 8 c.p.) £3.17s., N. £5½ p.a. Data to Mar. 31, 1909	129
P.	40=1,000 H.P.	2,329 KW.	156 KW.	Lg. 4; pb. lg. contract; pr. 2 to 1½; tr. 1½	Flat rate, contract & sl. scale	1,479,693	Lighting and traction. *By company. Bought by T.C. in 1896. Data to Mar. 31, 1912	130
..	..	341 KW. ..	..	Lg. 5; pr. 3; hg. 1½	Flat rate with dis.	77,486	*Resident engineer, F. C. Mann. Data to Dec. 31, 1909	131
P.	..	30,258 KW. ..	..	Lg. 4 & 3; pb. lg. arc £15 p.a.; pr. 2 to 1	Flat rate with dis.	480,000 (estimate)	A.C. supply at present taken in bulk. Data to May 15, 1910. (Est.)	132
P.	..	319 KW. ..	..	Lg. 5; pr. 3; hg. 1½	Flat rate	105,238	*Resident engineer, E. E. Smeeton. Data to Dec. 31, 1909	133
..	..	186 KW. ..	..	Lg. 6	Flat rate	97,668	.. ..	134
..	24=600 H.P.	1,480 KW.	102 KW.	Lg. 4½ net; pb. lg. arc £16; pr. 2½ to ¾; tr. 1.5	Flat rate, sl. scale & contract	827,816	Lighting and traction. Supply to Kearsley, and light railway to Pendlebury. Data to Mar. 31, 1912	135
..	..	200 KW. ..	..	Lg. 6 to 4½; pr. 3 to 1½	Sliding scale ..	119,689	Gas power. Data to Mar. 1908	136
..	..	350 KW. ..	..	Lg. 8 & 6½; pb. lg. 3½; pr. 6 to 4; htg. 3	Flat rate & sliding scale	100,000	* Undertaking leased to Co. by Felixstowe & Walton U.D.C.	137
P.	..	3,200 KW.	238 KW.	Lg. 6 & 3, or 4½; pb. lg. inc. £3 p.a.; pr. 2 & 1	Flat rate, max. dem., cont., t. sw. & spl.	1,178,029	Data to Mar. 31, 1912	139
..	..	.. ..	..	Lg. 6 to 4; pb. lg. & pr., contract	Flat rate & contract	..	Water power	140
..	..	1,227 KW.	77.9 KW.	Lg. 4½ to 3; pb. lg. 3; pr. 2 to 1½; htg. 1½	Sl. scale & 2-rate meter.	445,451	Data to March 31, 1912	141
..	..	4,096 KW. ..	..	Lg. 6 to 3; pb. lg. arc £14 & £18; pr. 3 to 1½	Flat rate	1,537,670	Supply to Sandgate and Hythe at 2,750 v. D.C. Data to Dec. 31, 1911	142
..	..	217 KW. ..	..	Lg. 5; pr. 4	Flat rate	10,650	Data for 1908	143
..	..	210 KW. ..	..	Lg. 6½; pb. lg. contract; pr. 1	Flat rate	..	Water power, also part oil	144
..	..	.. ..	..	Lg. 7; pr. 3 to 2; htg. 3 ..	Flat rate	..	Suction gas plant. Data to May 14, 1912	145
.P.	..	1,320 KW.	84 KW.	Lg. 7 & 3, or 6; pb. lg. 2½; pr. 4 & 1, or 2½	Max. dem., flat, 2-rate and contract	628,908	Data to April 30, 1912	146
..	..	332 KW.	22 KW.	Lg. 5 or 5 & 3½; pb. lg. cont.; pr. 3 to 2; htg. 1½	Fl., sl. sc., 2-rate mt & cont. with dis.	187,495	Water power mainly; part gas power. Data to Dec. 31, 1911	147
..	3,777 KW. tr. 250 KW.	21,865 KW.	11.4%	Lg. 3½ (less 5%); pr. 1½ with discounts	Flat rate with discounts	..	Merz & McLellan (cons. engs.) †Operated by Newcastle-upon-Tyne Elec. Supply Co. Data to Dec. 31, 1911	148
..	..	1,200 KW. ..	..	Lg. 7½ & 1½, or 4½ (slot mtr. 5½); pb. lg. 1½; pr. 2 to 1½; htg. 1	Max. dem.,flat rate, sl. scale & cont.	574,851	Bulk D.C. supply to Naval Authorities. *3-ph. pr., 173 & 207 v. †To Mar., 1911. Data to Mar. 31, 1912	149
31	..	56,814 KW.	4,041 KW.	Lg. 3½ to 2; pb. lg. arc £12 & £10 p.a.; pr. 1½ to ¾* (1910-11)	Max. demand, flat rate, cont. & spl.	40,823,090	8 stn.; at 2, part supply to sub-stn. 25~ 3-ph. at 6,500 v. *Spl. rates to very large pr. cons. Data to May 31, 1911	150
P.	16=480 H.P.	950 KW.	41 KW.	Lg. 4½; pr. 2½ & spl.; tr. 1½ ..	Flat rate & contract	579,934	Lighting and traction station. Data to end of 1911 ..	151
	60=2,100 H.P.	4,400 (abt.) KW.	..	Lg. 6 & 2, or 4 to 2½; pb. lg. 1.77; pr. 1½ to 3, and special; tr. 1	Max. dem., sl. scale & spcl.	1,600,551	Lighting and traction. Data to Mar. 31, 1912	152
P.	65 H.P. ..	1,064 KW.	87 KW.	Lg. 7 & 4, or 6; pb. lg. cont.; pr. 4 & 1½, or 2½	Max. demand, flat rate and contract	277,172	Data to Dec 31, 1911	153
..	..	.. ..	..	Lg. 7; pr. 4	Flat rate	..	Data to Dec., 1911	154
..	..	300 KW. ..	..	Lg. 6 & 4, or 1/8 per c.p. p.a.; pr. 3	Max. demand and contract	4,411	Data to Dec. 30, 1911	155
P.	..	185 KW. ..	..	Lg. 4½; pr. 2, 1½ & 1	Flat rate with dis.	45,102	*Current supplied in bulk by Gosport & Fareham Tramways Station at 1¼d. per unit. Data to Dec. 31, 1909	156
.	..	7,503 KW.	..	Lg. 6 & 1, or 3½ & 3; pb. lg. arc £13 p.a.; pr. 2 to .675; htg 1.	Max. demand, flat rate,sl. s.& 2-rate mtr.	3,822,765	Data to May 15, 1911	157
..	..	1,324 KW.	52 KW.	Lg. 7 & 3, or contract; pr. 4 & 1, or 2½, and special	Max. dem., flat, 2-rate & contract	361,929	Hire-purchase over 3, 5 or 7 years. Data to Dec. 31, 1911	158
.	..	15 KW. ..	..	Lg. 5; pb. lg. about 16/- p. lamp, 6 m. contract; pr. 1½; htg. 1½	Flat rate	5,256	Water power. Data to April 21, 1912	159
	36=900 H.P.	948 KW.	..	Lg. 7 & 1½, or 4*; pr. 2-rate, 5 & 1, or 1½; tr. 2 to 1½	Max. demand, flat, 2-rate m. & cont.	976,665	Lighting and traction. *Pb. lg. arc £30 & £10, inc. £3 14 p.a. Data to Mar. 31, 1911	160
	..	497 KW. ..	..	Lg. 5 to 3; pb. lg. 3; pr. 2½ ..	Sliding scale & flat rate	211,583	.. ..	161
..	..	2,000 KW. ..	..	Lg. 5 to 3½; pb. lg. 5, less 33⅓%; pr. 1½, or 2 to 1½	Flat rate & sliding scale	891,148	Data to Dec. 31, 1911	162
	82=2,250 H.P.	10,950 KW.†	20%	Lg. 3½ or fixed charge + 1d. per unit; 2½ to 0.85; tr. 1½ to 0.85	Flat rate, sl. scale, spcl. & contract	10,500,000* (estd.)	Lighting and traction. *And 380. Tr. 500. *Data to June 30, 1913 (estd.)	163
	..	55 KW. .. 18 KW.		Lg. 6; pr. 6	Flat rate	..	Data to Mar. 1912	164
	Max. dem. = 253 KW.	3,463 KW. (ex. tr.)	..	Lg. 3½; pb. lg. arc £20 p.a.*; pr. 2½ to 1 (time sw. 1d.); tr. 1½ to 1½	Flat rate, sl. scale, cont. w. dis. & t. sw.	2,477,212	Lg. & tr. (supply to Tram. Co.). *Inc. £2½. Data to Mar. 31, 1912	165
	..	3,551 KW.	..	Lg. 7 & 3, or 6, 5½; pb. lg. inc. £2½ p.a.; pr. 4 & 1½, or 2½, 2; htg. 2	Max. dem., flat rate, cont., t. sw. & spl.	1,447,933	Two stns., (1) steam and Diesel (2) gas and Diesel. H.T. D.C. (2,500 v.) to sub-stns. outside tn. Data to Ap.30,1912	166
P.	..	*	..	Lg. 7 to 4, less 1d. discount; pb. lg. cont.; pr. 4 to 2, less 1d. dis.	Flat rate, sl. sc., 2-rate mtr. & cont.	552,445	Part oil power (Diesel engines). *Number of lamps connected not registered. Data to Dec. 31, 1911	167
.P.	See other Table.	6,197 KW.	438 KW.	Lg. 4 to 3; pb. lg. £14 & £10 p.a.; pr. 2 to ¾; hg. 2; tr. 1½	Flat rate & sl. sc.; 2-rate & t. sw.	6,256,583	Lighting and traction (A.C. to sub-stations, 3-ph., 5,500 v., 25~). *Tr. 550v. Data to Mar. 31, 1912	168
.P.	..	1,737 KW.	120 KW.	Lg. 4; pr. 3 & 1	Max. dem. for pr., flat rate lg.	892,880	Data to Dec. 31, 1911	169
	..	3,678 KW.	..	Lg. 6, 4½, 3, & 2; pb. lg. average 1.8 inclusive; pr. 3, 1; htg. 1	Max. dem., 2-rate, cont. & time sw.	2,305,235	Small auxiliary plant at destructor works. Data to Mar. 31, 1912	170
P.	..	2,720 KW.	153 KW.	Lg. 6 & 2, or 5; pb. lg. 1½; pr. 5, 3 & 1½; htg. 1½	Max. dem., flat, con. with dis. & spl.	1,171,545	Data to Mar. 28, 1912	171
	..	1,212 KW.	23 KW.	Lg. inc. 7 & 4½, arc 7 & 1; pr. 4 & 1½ (restricted hrs. 1½).	Max. demand ..	457,489	Data to Dec. 31, 1911	172
	..	1,425 KW.	..	Lg. 6½ with dis.; pb. lg. arc £25, p.a.; pr. 2	Flat rate with discounts	969,943	Data to Mar. 31, 1912	173
P.	..	2,221 KW.	100 KW.	Lg. 5 & 3, or 4 (mills); pb. lg. about 1.25; pr. 2½ to 0.9	Max. dem., flat rate, sl. scale & cont.	2,027,625	Data to April 30, 1912	174
g.)	..	3,000 KW.	..	Lg. 3½, less 5%; pr. 3 to 1½	Flat rate with dis.	..	*Also bulk supply fm. C. of D. Co. Cons. Engrs. Merz & McLellan; Man. C. W. Fairweather. Data to Dec. 31,'11	175
	..	167 KW. ..	..	Lg. 5; pb. lg. 3; pr. 2	Flat rate with discounts	89,000	Data to Mar. 31, 1910	176
	400 KW. ..	1,977 KW.	169 KW.	Lg. 4; pb. lg. 1.73; pr. 2 to .65; tr. 3	Flat rate, sl. scale w. dis. cont. & spl.	1,831,615	Lighting and traction. Data to Mar. 31, 1912	177
				Lg. 5; pr. 1½; hg. 1½	Flat rate	585,205	*Engineer & Manager, E. G. Drummond. Data to Dec.	178

333	OXFORD
334	PAIGNTON
335	PAISLEY
336	PARTICK
337	PEMBERTON
338	PEMBROKE (DUBLIN)
339	PENARTH
340	PENRITH
341	PERTH
342	PETERBOROUGH
343	PLYMOUTH
344	PONTYPOOL
345	PONTYPRIDD
346	PORLOCK
347	PORTPATRICK
348	PORTSMOUTH
349	PRESCOT & DISTRICT
350	PRESTON
351	PUDSEY
352	QUEENSTOWN
353	RADCLIFFE
354	RAMSGATE
355	RATHMINES
356	RAWMARSH
357	READING
358	REDDITCH
359	REICATE
360	RHYL
361	RICHMOND (SURREY)
362	ROCHDALE
363	ROSS
364	ROTHERHAM
365	ROTHESAY
366	ROTTINGDEAN
367	ROUNDHAY
368	RUGBY
369	RYDE & ST. HELENS
370	ST. ALBANS
371	ST. ANDREWS
372	ST. ANNES-ON-SEA
373	ST. AUSTELL
374	ST. HELENS
375	SALE
376	SALISBURY
377	SALTBURN
378	SCARBOROUGH
379	SHANKLIN & SANDOWN
380	SHEERNESS AND QUEENBOROUGH
381	SHEFFIELD
382	SHILDON
383	SHIPLEY
384	SHREWSBURY
385	SIDCUP
386	SLEAFORD
387	SLOUGH & DATCHET
388	SMETHWICK AND OLDBURY
389	SOUTHAMPTON
390	SOUTHEND-ON-SEA
391	SOUTHGATE
392	SOUTHPORT
393	SOUTH SHIELDS
394	SPENNYMOOR
395	STAFFORD
396	STALYBRIDGE
397	STANFORD
398	STIRLING
399	STOCKPORT
400	STOCKTON-ON-TEES
401	STOKE-ON-TRENT & FENTON
402	STOWMARKET
403	STRATFORD-ON-AVON
404	STRETFORD
405	SUNDERLAND
406	SURBITON
407	SUTTON, CARSHALTON WALLINGTN & CREAM
408	SUTTON COLDFIELD

161	GRAYS THURROCK ..	Grays Thurrock Urban District Council	1901	E. D. Long ..	230 & 460	Direct ..	330	160	97 KW.	£23,680	339 KW.	201 inc., 45 N., 19 mtl.	24=72 H.P.	..	427
162	GREAT CROSBY AND WATERLOO	Liverpool District Lighting Co., Ltd.	1897	Oswin Hanson	220 & 440	Direct ..	650	325	160 A.	£63,894	..	103 mtl. ..	15=55 H.P...	..	2,000
163	GREENOCK	Greenock Corporation ..	1899	J. A. Robertson ..	250 & 500D.C. 110&220A.C.*	50~, 3-ph. and direct	6,900	4,505	334 KW.	£220,000†	2,340 KW.†	50 arc, 2 mtl.	755=9,635† H.P.	82=2,250 H.P.	10,9
164	GREYSTONES	Greystones Electric Light & Power Co., Ltd.	1910	Raymond F. Fry ..	100	50~, 1-ph.	60	23	..	£3,500	55 KW.	41 mtl. ..	..	..	55 K
165	GRIMSBY & DISTRICT	Grimsby Corporation	1901	W. A. Vignoles..	230 & 460	Direct ..	1,716	1,567	..	£102,317	2,041 KW.	84 arc, 6 cbn., 476 mtl.	233=1,500 H.P.	Max. dem. = 253 KW.	3,463 (e
166	GUERNSEY	Guernsey Electric Light and Power Co., Ltd.	1900	A. N. Rye ..	210 & 420	Direct ..	1,240	932	600 KW.	£140,608	966 KW.	21 mtl. ..	2,585 KW. ..	..	3,53
167	GUILDFORD	Guildford Electricity Supply Co., Ltd.	1896	H. L. Alderton .	220 & 440D.C. 220 A.C.	Direct & 50~, 1-ph.	750	417	220 KW.	£66,180		9 arc, 9 mtl.	106=562 H.P.	..	
168	HALIFAX	Halifax Corporation	1894	W. M. Rogerson	230&460 D.C. 250&400A.C.*	50~, 3-ph. and direct	5,100	3,034	630 KW.	£239,547	3,658 KW.	70 arc, 134 mtl.	615=2,894 H.P.	See other Table.	6,19
169	HAMILTON	Edmundson's Electricity Corporation (Lessees)	1903	G. Salter ..	240 & 480	Direct ..	780	553	150 KW.	£69,776	569 KW.	66 arc, 8 N. 1	49=1,051 H.P.	..	1,73
170	HANLEY, STOKE-ON-TRENT	County Borough of Stoke-on-Trent	1894	C. H. Yeaman ..	100, 200 & 400	100~, 1-ph.	1,900	1,946	..	£128,903	2, 246KW.	77 arc, 524 inc.	1,388 KW. ..	..	3,678
171	HARROGATE	Harrogate Corporation ..	1897	G. Wilkinson ..	200 & 100	50~, 1-ph.	2,150	800	..	£125,270	1,960 KW. htg. 234	1 arc, 705 mtl.	155=609 H.P.	..	2,729
172	HARROW	Harrow Electric Light and Power Co., Ltd.	1898	J. A. B. Horsley	220 & 440	Direct ..	854	385	77 KW.	£93,174	1,091 KW. (inc. motors)	..	..	..	1,218
173	HASTINGS	Hastings Corporation ..	1882	R. F. Ferguson..	200 & 400	100~, 1-ph.	1,750	572	80 KW.	£173,797	1,163 KW.	115 arc, 561 mtl.	61=208 H.P.	..	1,435
174	HAWICK	Urban Electric Supply Co., Ltd.	1901	Henry Joseph ..	240 & 480	Direct ..	1,280	843	50 KW.	£80,250	680 KW.	12 arc, 12 cbn., 475 mtl.	203=1,061 H.P.	..	2,221
175	HEBBURN & FELLING	Northern Counties Elec. Spy. Co., Ltd. (Owned by U.D.C.)	1903	J. Webber and W. R. Rogers	230 & 460D.C. 440 A.C.	Direct & A.C.	3,400*	F. 525	..	..	235 KW.	25 KW. ..	3,400 KW. (inc. pr. & htg.)	..	3,690
176	HEBDEN BRIDGE ..	Hebden Bridge Urban District Council	1904	J. W. Garside ..	240 & 480	Direct ..	215	125	48 KW.	£12,250	160 KW.	52 mtl. ..	29=115 H.P.	..	167 K
177	HECKMONDWIKE ..	Heckmondwike Urban District Council	1902	Geo. H. Carter ..	230 & 460 tr. 550	Direct ..	950	1,117	300 KW.	£41,497	379 KW.	10 arc, 149 cbn., 49 mtl.	131=1,122 H.P.	400 KW. ..	1,977
178	HENDON	Hendon Electric Supply Co., Ltd.	1908	K. A. Scott-Moncrieff*	240 & 415	50~, 3-ph.	Bulk sply.	440	..	£59,000	1,366 KW.	..	37=188 H.P.	..	1,790
179	HEREFORD	Hereford Corporation.. ..	1899	W. T. Kerr ..	220 & 440	Direct ..	810	418	50 KW.	£52,584	1,039 KW.	4 arc ..	86=562 H.P.	..	1,468
180	HERTFORD	North Metropolitan Elec. Pr. Distribution Co., Ltd.	1901	J. M. Bowman (Res.)*	230 & 460	Direct ..	†	171	..	£11,972	388.7 KW.	9 arc, 22 mtl.	44=169 KW.	..	562
181	HESTON & ISLEWORTH	Heston and Isleworth Urban District Council	1904	Percy E. Rycroft	240 & 480	Direct ..	750	481	250 KW.	£63,628	947 KW.	51 arc, 415 mtl.	66=413 H.P.	..	1,377
182	HEXHAM	Hexham and District Electric Supply Co., Ltd.	1906	Wilfred Hall (Cons. Eng.)	120 lg., 220 & 440 pr.	40~, 3-ph.	120	66	..	£10,403	120 KW.	..	12=23 H.P...	..	
183	HEYWOOD	Heywood Corporation ..	1900	Jas. Stott ..	200 & 400 tr 500	Direct ..	900	880	100 KW.	£34,544	277 KW.	84 mtl. ..	115=769½ H.P.	6=400 H.P.	850
184	HIGH BARNET	North Metropolitan Elec. Pr. Distribution Co., Ltd.	1900	H. W. Swann (Res.)*	230 & 460	Direct ..	†	333	..	£16,017	235.7 KW.	18 arc, 182 mtl.	37=157 KW.	..	6,066
185	HIGH WYCOMBE ..	Wycombe (Borough) Electric Light & Power Co., Ltd.	1898	W. E. Brandreth	210 & 420	Direct ..	830	724	110 KW.	£102,785	1,137 KW.	12 arc, 362 mtl.	137=730 H.P.	..	1,911
186	HINDHEAD AND DIST.	Hindhead & District Electric Light Co., Ltd.	1900	T. B. Reader ..	230 D.C., 100 A.C.	Direct & 50 ~, 1-ph.	240	62	88 KW.	£32,289	250 KW.	10 mtl. ..	11=33 H.P.	..	275
187	HITCHIN	Electric Supply Corporation, Ltd.	1903	K. A. Scott-Moncrieff*	240 & 480	Direct ..	200	65.5	77 KW.	£19,150	208 KW.	..	14=17½ H.P.	..	226 K
188	HOLYHEAD	Holyhead Urban District Council	1904	P. Williams ..	200 & 400	Direct ..	220	140	240 KW.	£21,405	212 KW.	9 arc, 452 cbn.	8=5½ H.P...	..	253 K
189	HONLEY	Honley Urban District Council	1904	Harry Marsden (Gen. Man.)	200	Direct ..	75	26	..	£3,100	80 KW.	2 arc, 99 inc.	3=6 H.P. ..	..	87 K
190	HORNSEY	Hornsey Corporation	1903	N. Staniland ..	240 & 480	Direct ..	1,800	953	500 A.	£163,028	3,279 KW. inc. pr.	58 arc, 183 mtl.	50 KW. ..	..	3,313
191	HORSHAM	Horsham Urban District Council	1902	J. B. Morgan ..	230 & 460	Direct ..	400	230	85 KW.	£32,770*	538 KW.	21 arc, 296 mtl.	84=113 H.P.	..	641 K
192	HOUGHTON-LE-SPRING	Houghton-le-Spring & Dist. Electric Lighting Co., Ltd.	1907	W. S. Verrill ..	220	40~, 3-ph.	Bulk supply*	..	..	..	96 KW.	24 mtl. ..	2,220 KW. (inc. collieries)	..	2,316
193	HOVE	Hove Electric Lighting Co., Ltd.	1892	C. B. Smith ..	220	Direct ..	2,080	1,018	36 KW.	£174,998	3,800 KW. (inc. htg.)	..	178=504B.H.P. Rad.=176 KW.	..	4,560
194	HOVE (ALDRINGTON)..	Hove Corporation	1905	H. H. Scott (Boro' Surveyor)	220 & 440	Direct ..	*	40.2	..	£10,098	198 KW.	40 mtl. ..	5=15 H.P. ..	..	198 K
195	HOYLAKE & W. KIRBY	Hoylake & W. Kirby Urban District Council	1901	C. J. Turner ..	230	50~, 1-ph.	625	330	300 A.H.	£52,019	1,341 KW.	3 arc, 429 cbn., 50 mtl., 8 N.	10=30 H.P.	..	1,691
196	HUDDERSFIELD ..	Huddersfield Corporation ..	1893	A. B. Mountain	100, 200, & 400*	100~, 1 ph. 50~, 3-ph.	5,750 3-ph. 3,150 1-ph.	3,153	..	£233,641	6,186 KW.	40 arc, 65 inc.	759=5,831 H.P.†	..	12,049
197	HULL	Hull Corporation	1893	H. Bell	230 & 440	Direct ..	6,454	4,790	488 KW.-hrs.	£354,977	6,657 KW.	28 arc, 42 Nernst	601=6,885 H.P.	..	11,788
198	ILFORD	Ilford Urban District Council	1901	A. H. Shaw ..	230 & 460 tr. 500	Direct ..	3,600	1,856	200 KW.	£190,640 (approx.)	3,002 KW.	98 arc, 50 cbn., 1,579 mtl.	138=722 H.P.	52=1,300 H.P.	4,829
199	ILFRACOMBE	Ilfracombe Electric Light & Power Co., Ltd.	1903	H. J. F. Stewart	240 & 480	Direct ..	330	194	8½ KW.	£35,435	484 KW.	..	50=131 H.P.	..	615 K
200	ILKESTON	Ilkeston Corporation	1903	H. P. Stokes ..	230 & 460 tr. 500	Direct ..	965*	710	..	£21,446	2,102 KW.	20 arc, 192 cbn., 40 mtl.	88=170 H.P.	26=650 H.P.	2,724 K
201	INCLETON (YORKS) ..	Ingleton Electric Lighting & Power Co., Ltd.	1900	D. Tattersall ..	100 & 200	Direct ..	29	22	12½ KW.	£8,000	63 KW.	38 inc. ..	9=26 H.P. ..	..	85 KW
202	INVERNESS	North of Scotland Electric Light & Power Co., Ltd.	1905	E. J. Williams..	240 & 480	Direct ..	830	324	100 KW.	£35,945	507 KW.	..	90=460 H.P.	..	967 KW
203	IPSWICH	Ipswich Corporation	1903	F. Ayton ..	230 & 460	Direct ..	1,511	1,313	210 KW.	£104,415	1,888 KW.	14 mtl. ..	402=1,908 H.P.	72=1,800 H.P.	3,791
204	JEDBURGH	Electric Supply Corporation Ltd.	1903	K. A. Scott-Moncrieff*	225 & 450	Direct ..	66	30	35 KW.	£13,000	88 KW.	9 arc, 12 cbn., 102 Nernst	7=24 H.P.	..	113 KW
205	KEIGHLEY	Keighley Corporation.. ..	1901	..	230 & 460 tr. 500	Direct ..	740	380	100 KW.	£57,409	833 KW.	18 arc, 24 cbn., 48 N.	108=490 H.P.	24=720 H.P.	1,366
206	KENDAL	Kendal Corporation	1902	John A. T. Barnes	220 & 440	Direct ..	109.5	77	40 KW.	£13,838	160 KW.	..	26=97 H.P.	..	244 K
207	KESWICK	Keswick Electric Light Co., Ltd.	1890	W. Jackson ..	100	75~, 1-ph.	120	60	..	£13,761	..	3 arc, 20 inc.	..	..	237 K
208	KETTERING	Kettering Urban District Council	1904	W. A. Walker ..	230 & 460	Direct ..	1,540	713	92 KW.	£69,405	684 KW.	80 arc, 920 mtl.	212=1,091 H.P.	..	1,602 K
209	KEYNSHAM & KINGSWOOD	Keynsham Electric Light & Power Co., Ltd.	1891	G. J. T. J. Parfitt	230	Direct ..	75	55	50 KW.	£4,350	119 KW.	6 Nernst, 11 9 inc.	6=26 H.P.	..	151 K
210	KIDDERMINSTER ..	Kidderminster & District Elec. Ltg. & Traction Co., Ltd.	1900	A. Charlton ..	230 & 460	Direct ..	1,550	575	220 KW.	£45,774	665 KW.	..	41=919 H.P.	26=680 H.P.	2,319 K
211	KILDARE	Naas Rural District Council	1905	H. Rylance ..	200	Direct ..	32	..	..	£3,300	..	..	..	..	330 K
212	KILLARNEY	Kerry Electric Supply Co., Ltd.	1898	Valentine Ryan	100	100~, 1-ph.	100	52	..	£9,000	133 KW.	..	..	..	150 KW
213	KILMACOLM	Kilmacolm Electric Lighting Co., Ltd.	1903	James White ..	240 & 480	Direct ..	50	52	20 KW.	£10,000	316 KW.	14 mtl. ..	5=7 H.P. ..	..	350 KW
214	KILMARNOCK	Kilmarnock Corporation ..	1904	W. M. C. Bexon	240 & 480 tr. 550	Direct ..	1,080	771	126 KW.	£55,897	917 KW.	50 arc, 31 mtl. & 160 on arc posts	109=869½ H.P.	28=730 H.P.	2,110 K
215	KINGSBURY	North Metropolitan Electric Power Supply Co.	1910	W. E. North (Res.)*	240 & 415	50~, 3-ph.	50	10.5	..	£4,596	10.5 KW.	74 mtl. ..	..	..	14.5 K
216	KING'S LYNN	King's Lynn Corporation ..	1899	C. W. Jackson ..	200 & 400	Direct ..	680	345	60 KW.	£50,766	757 KW.	20×2 cbn., 528 mtl.†	85=410½ H.P.	..	1,104 K
217	KINGSTON-UPON-THAMES	Kingston-upon-Thames Corporation	1898	J. E. Edgcome ..	105	77~, 1-ph.	800	672*	..	£109,334	63 KW.	76 arc†, 358 mtl.	111=483½ H.P.	..	2,015 K
218	KIRKCALDY	Kirkcaldy Corporation ..	1902	O. F. Francis ..	230 & 460, tr. 500	Direct ..	1,000	765	..	£65,098	..	104 arc, 212 cbn.	892 B.H.P...	44=1,332 H.P.	..
219	LANCASTER	Lancaster Corporation ..	1893	Geo. C. Milnes..	230 & 460, tr. 525	Direct ..	1,250	700	..	£62,252	1,093 KW.	41 arc, 84 mtl.	669 H.P. ..	24=640 H.P.	2,093 K
220	LARNE	Larne Electric Light Works, Ltd.	1901	M. G. Smyth ..	105 & 210	100~, 1-ph.	150	72	..	..	78 KW.	14 arc, 136 inc.	..	..	100 KW.
221	LEAMINGTON	Midland Electric Light & Power Co., Ltd.	1897	Percy Oliver ..	230	Direct ..	521	286	110 KW.	..	960 KW.	1 arc ..	48=101 H.P.	..	1,104 K
222	LEATHERHEAD ASHTEAD & MICKLEHAM	Leatherhead & District Electricity Co., Ltd.	1902	H. Leslie Dixon	220 & 440	Direct ..	200	132	80 KW. (600 A.H.)	£37,383	389 KW.	58 mtl. ..	90=855 H.P.	..	484 KW
223	LEEDS	Leeds Corporation	1893	H. Dickinson ..	100, 200 & 400	50~, 1-ph. 2 & 3-ph.	15,440	9,560	..	£987,004	10,813 KW.	660 arc, 2,2 mtl.	2,965=17,070 H.P.	..	26,626 K
224	LEEK	Leek Urban District Council..	1904	R. M. Carr ..	230 & 460	Direct ..	650	312	73.5 KW.	£28,444	239 KW.	..	574 H.P.	..	732 KW
225	LEICESTER	Leicester Corporation.. ..	1894	T. Robert Smith	100 & 200	50~, 1-ph.	4,400	2,240	..	£297,880	8,032 KW.	..	50=1,676 H.P.	..	9,279 K
226	LEIGH	Leigh Corporation	1899	Arthur T. Smith	220 & 440	Direct ..	700	671	132 KW.	£46,000 (estd.)	700 KW.	..	180=1,100 H.P	..	1,444 K
227	LEITH	Leith Corporation	1899	A. P. Rutherford	230 & 460 tr. 500	Direct ..	3,450	2,135	75 KW.	£163,677	2,635 KW.	397 arc, 2 mtl.	526=4,165 H.P.*	72=2,160 H.P.	6,605 K
228	LETCHWORTH	First Garden City Co., Ltd. ..	1907	Charles Gould ..	250 & 500	Direct ..	580	250	150 KW.	£20,000	50 KW.	..	60=250 KW.	..	300 KW
229	LEWES	Lewes & District Electric Supply Co. Ltd.	1901	H. J. Williams..	230 & 460	Direct ..	330	145	92 KW.	..	405 KW. (approx.)	..	25=134 H.P.	..	562 KW
230	LEYTON	Leyton Urban District Council	1896	F. Harman Lewis	150 & 300 tr. 500	Direct ..	3,140	1,050 lg. 910 tr.	64 KW.	£179,203	2,060 KW.	82 arc, 819 cbn., 687 mtl.	86=232 H. P.	120=3,600 H.P.	5,700 K
231	LIMAVADY	Limavady Power & Light Works	1897	E. J. S. Ritter ..	110 & 220	100~, 1-ph.	60	60	..	..	50 KW.	..	..	..	50 KW
232	LIMERICK	Limerick Corporation ..	1902	P. T. MacNamara	230	Direct ..	400	275	96 KW.	£35,000	..	61 arc, 1 mtl.	..	..	500 KW

~=cycles per second; lg. = lighting; pb. lg. = public lighting; pr. = power; htg. = heating; inc. = incandescent; cbn. = carbon; mtl. = metal filament; N. = Nernst; A. = amperes; A.H. = ampere-hours; ph. = phase; A

..	497 KW.	..	Lg. 5 to 3; pb. lg. 3; pr. 2½ ..	Sliding scale & flat rate	211,580	.. ..	161	
..	2,000 KW.	..	Lg. 5 to 3½; pb. lg. 5, less 33⅓%; pr. 1½, or 2 to 1½	Flat rate & sliding scale	391,143	Data to Dec. 31, 1911	162	
82=2,250 H.P.	10,950 KW.†	20%	Lg. 3½ or fixed charge + 1d. per unit; 2½ to 0.85; tr. 1½ to 0.85	Flat rate, sl. scale, spcl. & contract	10,500,000* (estd.)	Lighting and traction. *And 380. Tr. 500. *Data to June 30, 1912 (estd.)	163	
..	55 KW. ..	18 KW.	Lg. 6; pr. 6	Flat rate ..	..	Data to Mar. 1912	164	
Max. dem. = 252 KW.	3,468 KW. (ex. tr.)	..	Lg. 3½; pb. lg. arc £20 p.a.*; pr. 2½ to 1 (time sw. 1d.); tr. 1½ to 1½	Flat rate, sl. scale, cont. w. dis. & t. sw.	2,477,312	Lg. & tr. (supply to Tram. Co.). *Inc. £2½. Data to Mar. 31, 1912	165	
..	3,551 KW.	..	Lg. 7 & 3, or 6, 5½; pb. lg. inc. £2½ p.a.; pr. 4 & 1½, or 2½, 2; htg. 2	Max. dem., flat rate, cont., t. sw. & spl.	1,447,933	Two stns., (1) steam and Diesel (2) gas and Diesel. H.T. D.C. (3,600 v.) to sub-stns. outside in. Data to Ap. 30, 1912	166	
..	*	..	Lg. 7 to 4, less 1d. discount; pb. lg. cont.; pr. 4 to 2, less 1d. dis.	Flat rate, sl. sc., 2-rate mtr. & cont.	552,445	Part oil power (Diesel engines). *Number of lamps connected not registered. Data to Dec. 31, 1911	167	
See other Table.	6,197 KW.	438 KW.	Lg. 4 to 3; pb. lg. £14 & £10 p.a.; pr. 2 to ⅞; hg. 2; tr. 1½	Flat rate & sl. sc.; 2-rate & t. sw.	6,256,583	Lighting and traction (A.C. to sub-stations, 3-ph., 5,500 v., 25~). *Tr. 550v. Data to Mar. 31, 1912	168	
..	1,737 KW.	180 KW.	Lg. 4; pr. 2 & 1	Max. dem. for pr., flat rate lg.	892,830	Data to Dec. 31, 1911	169	
..	3,678 KW.	..	Lg. 6, 4½, 3, & 2; pb. lg. average 1.8 inclusive; pr. 3, 1; hrg. 1	Max. dem., 2-rate, cont. & time sw.	2,205,935	Small auxiliary plant at destructor works. Data to Mar. 31, 1912	170	
..	2,729 KW.	153 KW.	Lg. 6 & 2, or 5; pb. lg. 1½; pr. 5, 2 & 1½; htg. 1½	Max. dem., flat, con. with dis. & spl.	1,171,545	Data to Mar. 28, 1912	171	
..	1,213 KW.	23 KW.	Lg. inc. 7 & 4½, arc 7 & 1; pr. 4 & 1½ (restricted hrs. 1½).	Max. demand ..	457,489	Data to Dec. 31, 1911	172	
..	1,425 KW.	..	Lg. 6½ with dis.; pb. lg. arc £26, p.a.; pr. 2	Flat rate with discounts	989,943	Data to Mar. 31, 1912	173	
..	2,221 KW.	100 KW.	Lg. 5 & 3, or 4 (mills); pb. lg. about 1.26; pr. 2½ to 0.9	Max. dem., flat rate, sl. scale & cont.	2,027,625	Data to April 30, 1912	174	
..	3,690 KW.	..	Lg. 8½, less 5%; pr. 3 to 1½	Flat rate with dis.	..	*Also bulk supply fm. C. of D. Co. Cons. Engrs. Merz & McLellan; Man. C. W. Fairweather. Data to Dec. 31,'11	175	
..	167 KW. ..	..	Lg. 5; pb. lg. 3; pr. 2	Flat rate with discounts	89,000	Data to Mar. 31, 1910	176	
400 KW. ..	1,977 KW.	169 KW.	Lg. 4; pb. lg. 1.72; pr. 2 to .65; tr. 2	Flat rate, sl. scale w. dis. cont. & spl.	1,321,615	Lighting and traction. Data to Mar. 31, 1912	177	
..	1,790 KW.	507 KW.	Lg. 5; pr. 1½; hg. 1½	Flat rate	595,995	*Engineer & Manager, B. G. Drummond. Data to Dec. 31, 1911	178	
..	1,468 KW.	185 KW.	Lg. 4½; pr. 3 to 1, with dis. ..	Flat rate, 2-rate, & sl. scale with dis.	561,288 (estimated)	Data to Mar. 25, 1912	179	
..	562 KW.	50.5 KW.	Lg. 7 & 2 (max. 5); pb. lg. arc £14½ p.a.; pr. 4 or 3, & 1	Max. demand and flat rate	237,845	*E. T. R. Murray, engineer-in-chief. †Bulk supply from North Met. El. Power Supply Co. Data to Dec 31, '11	180	
..	1,377 KW.	234 KW.	Lg. 4, or telephone*; pb. lg. arc £30 50-c.p. mtl. £8 p.a.,; pr. 2 to 1	Flat rate & special.	804,202	Station run in conjunction with 6-cell destructor. Data to Mar. 31, 1912. *Outside arcs £3 p.a.	181	
..	..	..	Lg. 5; pr. 2	Flat rate with discounts	47,400	Over 40,000 units used on battery charging. Data to Dec. 31, 1911	182	
6=400 H.P.	850 KW.	337 KW.	Lg. 6 & 3, or 4½; pb. lg. contract; pr. 2½ and 1½; tr. 1.8	Flat rate, sl. scale, cont. & special	820,795	Lighting and traction. Data to Mar. 31, 1912	183	
..	6,066 KW.	39.7 KW.	Lg. 7 & 2, or 5; pb. lg. contract; pr. 4 or 3, & 1	Max. dem., flat rate, and cont. w. dis.	494,011	*E. T. R. Murray, engineer-in-chief. †Bulk supply from North Metropolitan E. P. S. Co. Data to Dec. 31, 1911	184	
..	1,911 KW.	133 KW.	Lg. 5 & 2; pb. lg. arc £13, N. £3; pr. 4 & 1, or 2½	Max. dem., flat rate 2-rate & cont. w. dis.	1,070,381	Data to Dec. 31, 1911	185	
..	275 KW.	..	Lg. 8; pb. lg. £2½ per lamp p.a.; pr. 4	Flat rate and cont.	103,370	Part oil power. Large extensions in progress. Data to Dec. 31, 1911	186	
..	226 KW. ..	..	Lg. 5; pr. 3; hg. 1½	Flat rate	50,390	*Resident engineer, Geo. T. Laverty. Data to Dec. 31, 1909	187	
..	253 KW. ..	..	Lg. 5; pb. lg. 3; pr. 3	Flat rate	125,287	Data to Mar. 31, 1908	188	
..	87 KW.	..	Lg. 4½ (less 8⅓%); pb. lg. 3; pr. 2½	Flat rate with discount	27,114	.. ..	189	
..	3,813 KW.	220 KW.	Lg. 7 & 2, or 5 w. dis.; pb. lg. 3 & 2; pr. 2½ & 1, or 2, or 70/- + ⅔	Max. demand and flat rate w. rebates	1,237,874	Extensions in hand, 750 KW. Data to Mar. 1912 ..	190	
..	641 KW. ..	53.6 KW.	Lg. 7 & 3, or 6; pb. lg. 4; pr. 3 & 1½, & special	Max. demand, flat rate & contracts	242,701*	*to March 31, 1911. Data to Mar. 31, 1912	191	
..	2,316 KW.	..	Lg. 4; pb. lg. £1 7s. per lamp per season; pr. 2 less dis.	Flat rate with discounts	..	*Bulk supply from Durham Col. Elec. Pr. Co., Ltd. Dist. by Newcastle-on-T. Elec. Supply Co., Ltd..	192	
..	4,560 KW.	263 KW.	Lg. 5½, or 7 & 4; pr. 3 & 1 ..	Flat rate and max. demand	1,139,328	Data to Dec. 31, 1911	193	
..	198 KW. ..	13 KW.	Lg. 7 & 4, or 5; pb. lg. 2; pr. 5 & 2, or 3½ (2, time-switch).	Max. demand, flat rate & time switch	53,371	*Bulk supply from Brighton Corporation. Data to Mar. 31, 1912	194	
..	1,691 KW.	..	Lg. 7 & 3, or 5½; pb. lg. 3½; pr. 3 & 1½, or 2	Max. dem., flat, sl. scale, 2-rate & t.s.	401,602	.. ..	195	
..	12,049 KW.	50.9 KW.	Lg. 4; pb. lg. arc £17½, inc. 33s. p.a., pr. 2 & 1 (3-ph., 1 w. dis.)	Flat rate w. dis., sl. scale, cont. & spl.	5,900,390	*100 & 230 v. 1-ph.; 400 v., 3-ph. †539=1765 H.P. 1-ph.; 230=4,066 H.P. 3-ph. Data to Dec. 31, 1911	196	
..	11,788 KW.	..	Lg. 5 & 1½, or 4; pb. lg. arc £22, N. £6; pr. 2 to 1, w. discount	Max. dem., flat, sl. sc. w. dis., cont., t. sw.	5,806,726	Data to Mar. 31, 1910	197	
52=1,300 H.P.	4,829 KW.	180 KW.	Lg. 6 & 1, or 3½; pb. lg. arc £18 & £9*; pr. 2 to 1, or 3 & 1; tr. 1.125†	Max. demand, flat rate, & sl. scale	3,422,782	Lighting & traction. *Inc., £3½ p.a.; 32 C.P. cbn. or 50 and 60 C.P. mtl. †Htg. 1½ & 1. Data to Mar. 31, 1912	198	
..	615 KW.	68 KW.	Lg. 7 & 3, or 6; pr. 4 & 1½ ..	Max. dem., flat rate, and cont. w. dis.	176,412	Data to Dec. 31, 1911	199	
26=650 H.P.	2,734 KW.	93 KW.	Lg. 3; pb. lg. 2½; pr. 2 to 1½; tr. 1	Flat rate w. dis. ..	706,444	*Supply in bulk from Derby & Notts Electric Power Co. Data to Mar. 31, 1912	200	
..	85 KW. ..	..	Lg. 6; pb. lg. 2.9; pr. 3 to 1 ..	Flat rate, sliding scale and contract	18,000 (approx.)	Water power. Data to Mar. 21, 1912	201	
..	967 KW. ..	105 KW.	Lg. 7 & 3, or 6; pr. 4 & 1½, or 2½	Max. demand and flat rate	413,654	Data to Dec. 31, 1911	202	
72=1,800 H.P.	3,791 KW.	995 KW.	Lg. 4 less 5% cash; pb. lg. 1.862; pr. 2 to 1½; tr. 1.875	Flat rate	2,050,885	Lighting and traction. Data to Mar. 31, 1912	203	
..	113 KW. ..	..	Lg. 6; pb. lg. 3; pr. 3; hg. 1½	Flat rate	37,960	*Resident engineer, J. H. Dennison. Data to Dec. 31, 1909	204	
24=720 H.P.	1,866 KW.	..	Lg. 7 & 2, or 4½ to 4; pb. lg. 1.78; pr. 2 to 1; tr. 1.75	Max. dem., flat, sl. scale & cont. w. dis.	522,433	Lighting and traction	205	
..	244 KW.	..	Lg. 6; pr. 2½ to 1½	Flat rate	55,594	Part gas power. Data to Mar. 31, 1910	206	
..	237 KW.	..	Lg. 6; pb. lg. contract; pr. 3 ..	Flat rate	53,568	Part water power.	207	
..	1,602 KW.	234 KW.	Lg. 4½ (arc 3 & 3½*); pb. lg. arc £17†; pr. 2 to 1; htg. 1	Flat rate, sl. sc., & max. dem. w. dis.	1,062,598	*Or for domestic purposes £12 p.a. per KW. (max.d.) & 1 p.u.† Inc. £5 5s. all ngt.; £3 3s. ½-ngt. Data to Mar. 31,'12	208	
..	151 KW.	..	Lg. 6; pb. lg. £226 p.a.; pr. 3 to 2½	Flat rate with discount	58,400	.. ..	209	
26=680 H.P.	2,319 KW.	..	Lg. 7 & 2½ (ave. max. 4½) w. discount; pr. 4½ & 1½	Max. demand w. dis., & 2-rate mr.	1,042,194	Lighting and traction. Data to Dec. 31, 1907	210	
..	230 KW.	..	Lg. 5; pr. 2½	Flat rate	..	.. ..	211	
..	150 KW. ..	..	Lg. 6d. with discounts	Flat rate	..	100-H.P. turbine and alternator being installed. Data to April 14, 1910	212	
..	350 KW. ..	5 KW.	Lg. 6; pb. lg. 2½/- per lamp p.a.; pr. 4	Flat rate	55,071	Data to Dec. 31, 1911. Residential district	213	
28=730 H.P.	2,110 KW.	1,022 KW.	Lg. 4½ w. dis.; pb. lg. £761; pr. 2 w. dis. to ½; tr. 1½; htg. 1½	Sliding scale and flat rate	1,145,280	Lighting and traction. Data to May 15, 1912	214	
..	14.5 KW.	..	Lg. 7 & 2, or 5; pb. lg. £5½ & £3; pr. 4 or 3 & 1	Max. demand and flat rate	19,845	*Eng.-in-chief, E. T. R. Murray. Data to Dec. 31, 1911	215	
..	1,104 KW.	60 KW.	Lg. 4; pb. lg. 2.28; pr. 3 to 1; htg. 1½	Flat rate and max. demand* & spl.	78,757	Part gas power. *Pr. max. demand; flat rate in day-time. †470 50-c.p., 18 300-c.p. Data to Mar. 31, 1912	216	
..	2,015 KW.	515 KW.	Lg. 5, or 7 & 3; pb. lg. arc £20, 32-C.P. inc. £3½ p.a.; pr. 1½.	Max. demand and flat rate	871,089	*Ex. street lg. †Two 32-c.p. inc. used after midnight. Data to Mar. 31, 1912	217	
44=1,232 H.P.	..	..	Lg. 4½ to 3; pb. lg. arc £12 p.a.; pr. 1½ to ⅔; tr. 1½	Sliding scale ..	1,572,856	Lighting and traction. Data to May 15, 1909	218	
24=640 H.P.	5,098 KW.	..	Lg. 4½ (5% dis.); pb. lg. 1.5; tr. 1.7*	Flat, sl. sc., 2-rate & cont. w. dis. & t.sw.	808,927	Lg. & tr. Gt. incr. in pr. & domestic loads. *Pr 2½ & 1½ & £3 7s. p. B.H.P. plus ½d. p.u (5% dis.) Data to Mar. 31, '12	219	
..	100 KW. ..	..	Lg. 8 to 1½; pb. lg. 2½ inclusive	Flat rate, contract and special	..	.. ..	220	
..	1,104 KW.	103 KW.	Lg. 6 & 2½, or 5½*; pr. 2½ or £5 p. H.P. p.a. & 1½ p.u.	Max. demand, flat rate, 2-rate & t. sw.*	218,207	*Time switch and 2-rate meter, 6d. and 2½d. Data to Dec. 31, 1912	221	
..	484 KW. ..	..	Lg. 6½ to 5 (2-rate 5 & 3*); pr. 3 to 2½, or £14 per KW. p.a. + 2 p.u.	Flat rate, sl. scale, & 2-rate meter.	175,769	*Or 12/- per 32-w. lamp p.a. Diesel oil engines. Data to Dec. 31, 1911	222	
..	26,626 KW.	2,780 KW.	Lg. 4 & 1; pb. lg. 1½; pr. 1½ to 0.75 (less 5%)	Special scale* and max. demand	17,841,572	*Lg., 4d. first 1,000 hrs. use of lamps, 1d. after; pr. max. demand. Data to Mar. 31, 1912	223	
..	782 KW. ..	97.4 KW.	Lg. 7 to 3, or 6½ to 4; pr. 2 to 1.35	Max. dem., flat, sl. sc., t. sw., 2-r. mtr. & cont.	529,416	Producer gas power (pressure type), using bituminous fuel. 1 Diesel engine. Data to Mar. 31, 1912	224	
..	9,279 KW.	425 KW.	Lg. 4 & 3½; pr. 2 to 0.72; htg. & ckg. 1	Flat rate & sl. scale	2,349,163	Data to Dec. 31, 1911	225	
..	1,444 KW.	..	Lg. 7 & 2, or 4½; pr. 3½ & 1; all less 5%	Max. demand & flat rate	809,375	Data to March 31, 1910	226	
72=2,160 H.P.	6,605 KW.	..	Lg. 3½ w. dis.; pb. lg. arc £.4, £10½ & £7; pr. 1½ w. dis.; tr. ⅔	Flat rate, with discounts	3,442,227 May 15 '11	Lighting & traction. *Also 85 radiators=36 KW. Data to Mar. 31, 1912	227	
..	300 KW.	150 KW.	Lg. 8, & 1½ or 5; pr. 1½	Max demand, flat rate, & special*	254,889	*20% of output supplied to the Co. for pumping, at ½d. per unit. Data to Sep. 30, 1911	228	
..	552 KW. ..	76 KW.	Lg. 7 & 2½, or 5; pr. 4½ & 1½, or 2½	Max. demand & flat rate	157,798*	*During 1911. Data to April 2, 1912	229	
120=3,600 H.P.	5,700 KW.	..	Lg. 5 & 2, or 4*; pr. 3 & 1, or 1½; tr. 1½	Max. demand & flat rate	3,553,398	Lighting and traction. *Pb. lg. arc £31, inc. £4.3.6 (two 40-C.P.) per annum. Data to Mar. 31, 1909	230	
..	50 KW.	..	10s. per 8-C.P., or 6d. per unit ..	Contract or flat rate	..	Water power. Data to May, 1912	231	
..	500 KW. ..	..	Lg. 5; pr. 3 & 1½	Flat rate with discounts	260,000	Producer gas power. Data to Dec. 31, 1909	232	

hours; ph. = phase; A.C. = alternating current; D.C. = direct current.

383	SOUTH SHIELDS ..
384	SPENNYMOOR .. ..
385	STAFFORD .. ..
386	STALYBRIDGE .. ..
387	STAMFORD .. ..
388	STIRLING .. ..
389	STOCKPORT .. ..
390	STOCKTON-ON-TEES ..
391	STOKE-ON-TRENT & FENTON
392	STOWMARKET .. ..
393	STRATFORD-ON-AVON
394	STRETFORD .. ..
395	SUNDERLAND .. ..
396	SURBITON .. ..
397	SUTTON, CARSHALTON WALLINGTN & CHEAM
398	SUTTON COLDFIELD ..
399	SWANSEA .. ..
400	SWINDON .. ..
401	SWINTON & PENDLEBURY
402	TAUNTON .. ..
403	THIRSK AND SOWERBY
404	TODMORDEN .. ..
405	TONBRIDGE .. ..
406	TONYREFAIL AND CILFACH COCH
407	TOPSHAM .. ..
408	TORQUAY .. ..
409	TOTNES .. ..
410	TOTTENHAM .. ..
411	TRAFFORD PARK ..
412	TREETON .. ..
413	TUNBRIDGE WELLS ..
414	TWICKENHAM, HAMPTON & TEDDINGTON*
415	TYNEMOUTH .. ..
416	UXBRIDGE AND DIST.
417	VENTNOR, BONCHURCH AND ST. LAWRENCE
418	WADEBRIDGE .. ..
419	WAKEFIELD .. ..
420	WALLASEY .. ..
421	WALSALL .. ..
422	WALTHAMSTOW ..
423	WALTON-ON-NAZE ..
424	WARRINGTON .. ..
425	WATFORD .. ..
426	WEDNESBURY .. ..
427	WELLINGBOROUGH ..
428	WEST BROMWICH ..
429	WEST HAM .. ..
430	WEST HARTLEPOOL ..
431	WESTON-SUPER-MARE
432	WEYBRIDGE AND WALTON-ON-THAMES
433	WEYMOUTH & MELCOMBE REGIS
434	WHITBY .. .. ..
435	WHITCHURCH AND PANGBOURNE
436	WHITEHAVEN .. ..
437	WIGAN .. .. ..
438	WILLESDEN .. ..
439	WIMBLEDON, MERTON, MALDENS & COOMBE
440	WINCHESTER .. ..
441	WINDERMERE AND AMBLESIDE
442	WINDSOR & ETON ..
443	WISHAW .. .. ..
444	WITNEY .. .. ..
445	WOKING .. .. ..
446	WOLVERHAMPTON ..
447	WORCESTER .. ..
448	WORKSOP .. ..
449	WORMIT .. .. ..
450	WORTHING .. ..
451	WREXHAM .. ..
452	YARMOUTH .. ..
453	YORK .. .. ..
454	YSTRADGYNLAIS ..

191	HORSHAM	Horsham Urban District Council	1902	J. B. Morgan ..	230 & 460	Direct ..	400	230	85 KW.	£32,770*	inc. pr. 538 KW.	21 arc, 296 mtl.	34=113 H.P.	..	641
192	HOUGHTON-LE-SPRING	Houghton-le-Spring & Dist. Electric Lighting Co., Ltd.	1907	W. S. Verrill ..	230	40~, 3-ph.	Bulk supply*	..	..	..	96 KW.	24 mtl. ..	2,230 KW. (inc. collieries)	..	2,316
193	HOVE	Hove Electric Lighting Co., Ltd.	1892	C. B. Smith ..	220	Direct ..	2,080	1,012	36 KW.	£174,998	3,800 KW. (inc. htg.)	..	173=504 B.H.P. Rad.=176 KW.	..	4,560
194	HOVE (ALDRINGTON) ..	Hove Corporation	1905	H. H. Scott (Boro' Surveyor)	220 & 440	Direct ..	*	40.2	..	£10,098	198 KW.	40 mtl. ..	5=15 H.P. ..	..	198
195	HOYLAKE & W. KIRBY	Hoylake & W. Kirby Urban District Council	1901	C. J. Turner ..	230	50~, 1-ph.	625	330	300 A.H.	£52,019	1,341 KW.	3 arc, 429 cbn., 50 mtl., 8 N.	10=30 H.P.	..	1,691
196	HUDDERSFIELD ..	Huddersfield Corporation ..	1898	A. B. Mountain	100, 200, & 400*	100~, 1 ph. 50~, 3-ph.	5,750 3-ph. 3,150 1-ph.	3,152	..	£233,641	6,186 KW.	40 arc, 65 inc.	759=5,881 H.P.†	..	12,04
197	HULL	Hull Corporation	1898	H. Bell	220 & 440	Direct ..	6,454	4,790	438 KW.-hrs.	£354,977	6,657 KW.	28 arc, 42 Nernst	601=6,885 H.P.	..	11,78
198	ILFORD	Ilford Urban District Council	1901	A. H. Shaw ..	230 & 460 tr. 500	Direct ..	3,600	1,856	200 KW.	£190,640 (approx.)	3,002 KW.	98 arc, 50 cbn., 1,679 mtl.	189=722 H.P.	72=1,800 H.P.	4,822
199	ILFRACOMBE	Ilfracombe Electric Light & Power Co., Ltd.	1903	H. J. F. Stewart	240 & 480	Direct ..	330	194	8½ KW.	£35,425	484 KW.	..	50=181 H.P.	..	615
200	ILKESTON	Ilkeston Corporation	1903	H. P. Stokes ..	230 & 460 tr. 500	Direct ..	965*	710	..	£21,446	2,102 KW.	20 arc, 192 cbn., 40 mtl.	88=170 H.P.	26=650 H.P.	2,724
201	INGLETON (YORKS) ..	Ingleton Electric Lighting & Power Co., Ltd.	1900	D. Tattersall ..	100 & 200	Direct ..	29	23	19½ KW.	£8,000	63 KW.	38 inc. ..	9=26 H.P. ..	..	85 KW
202	INVERNESS	North of Scotland Electric Light & Power Co., Ltd.	1905	E. J. Williams..	240 & 480	Direct ..	330	324	100 KW.	£35,945	507 KW.	..	90=460 H.P.	..	967
203	IPSWICH	Ipswich Corporation	1903	F. Ayton ..	230 & 460	Direct ..	1,511	1,313	210 KW.	£104,415	1,888 KW.	14 mtl. ..	402=1,903 H.P.	72=1,800 H.P.	3,791
204	JEDBURGH	Electric Supply Corporation Ltd.	1903	K. A. Scott-Moncrieff*	225 & 450	Direct ..	66	30	35 KW.	£13,000	88 KW.	9 arc, 12 cbn., 102 Nernst	7=24 H.P.	..	113 K
205	KEIGHLEY	Keighley Corporation	1901	..	230 & 460 tr. 500	Direct ..	740	330	100 KW.	£57,409	333 KW.	18 arc, 24 cbn., 48 N.	108=490 H.P.	24=720 H.P.	1,366
206	KENDAL	Kendal Corporation	1902	John A. T. Barnes	220 & 440	Direct ..	109.5	77	40 KW.	£13,888	160 KW.	..	26=97 H.P.	..	244
207	KESWICK	Keswick Electric Light Co., Ltd.	1890	W. Jackson ..	100	75~, 1-ph.	120	60	..	£18,761	..	3 arc, 20 inc.	..	..	237
208	KETTERING	Kettering Urban District Council	1904	W. A. Walker ..	230 & 460	Direct ..	1,540	713	92 KW.	£69,405	684 KW.	30 arc, 320 mtl.	212=1,091 H.P.	..	1,602
209	KEYNSHAM & KINGSWOOD	Keynsham Electric Light & Power Co., Ltd.	1891	G. J. T. J. Parfitt	230	Direct ..	75	55	50 KW.	£4,350	119 KW.	6 Nernst, 11 9 inc.	6=26 H.P.	..	151
210	KIDDERMINSTER ..	Kidderminster & District Elec. Ltg. & Traction Co., Ltd.	1900	A. Charlton ..	230 & 460	Direct ..	1,550	575	230 KW.	£45,774	665 KW.	..	41=919 H.P.	26=680 H.P.	2,319
211	KILDARE	Naas Rural District Council	1905	H. Rylance ..	200	Direct ..	32	..	..	£3,800	..	..	..	..	230
212	KILLARNEY	Kerry Electric Supply Co., Ltd.	1898	Valentine Ryan	100	100~, 1-ph.	160	52	..	£9,000	133 KW.	..	..	..	150 KW
213	KILMACOLM	Kilmalcolm Electric Lighting Co., Ltd.	1908	James White ..	240 & 480	Direct ..	50	52	20 KW.	£10,000	316 KW.	14 mtl. ..	5=7 H.P. ..	..	350 KW
214	KILMARNOCK	Kilmarnock Corporation ..	1904	W. M. C. Bexon	240 & 480 tr. 550	Direct ..	1,090	771	126 KW.	£55,897	917 KW.	50 arc, 31 mtl. & 100 on arc posts	109=869½ H.P.	28=730 H.P.	2,110
215	KINGSBURY	North Metropolitan Electric Power Supply Co. (Res.)*	1910	W. E. North	240 & 415	50~, 3-ph.	50	10.5	..	£4,593	10.5 KW.	74 mtl. ..	..	..	14.5
216	KING'S LYNN	King's Lynn Corporation ..	1899	C. W. Jackson ..	200 & 400	Direct ..	680	345	60 KW.	£50,766	757 KW.	20×2 cbn., 528 mtl.†	85=410½ H.P.	..	1,104
217	KINGSTON-UPON-THAMES	Kingston-upon-Thames Corporation	1893	J. E. Edgcome ..	105	77~, 1-ph.	860	672*	..	£109,334	63 KW.	76 arc†, 358 mtl.	111=482⅝ H.P.	..	2,015
218	KIRKCALDY	Kirkcaldy Corporation ..	1902	Q. F. Francis ..	230 & 460, tr. 500	Direct ..	1,090	765	..	£65,098	..	104 arc, 212 cbn.	882 B.H.P. ..	44=1,282 H.P.	..
219	LANCASTER	Lancaster Corporation ..	1898	Geo. C. Milnes..	230 & 460, tr. 525	Direct ..	1,250	700	..	£62,252	1,093 KW.	41 arc, 84 mtl.	689 H.P. ..	24=640 H.P.	2,098
220	LARNE	Larne Electric Light Works, Ltd.	1891	M. G. Smyth ..	105 & 210	100~, 1-ph.	150	72	..	..	78 KW.	14 arc, 136 inc.	..	..	100 KW
221	LEAMINGTON	Midland Electric Light & Power Co., Ltd.	1887	Percy Olver ..	230	Direct ..	524	286	110 KW.	..	960 KW.	1 arc ..	48=101 H.P.	..	1,104
222	LEATHERHEAD ASHTEAD & MICKLEHAM	Leatherhead & District Electricity Co., Ltd.	1902	H. Leslie Dixon	220 & 440	Direct ..	200	132	80 KW. (600 A.H.)	£37,888	389 KW.	58 mtl. ..	90=855 H.P.	..	484 KW
223	LEEDS	Leeds Corporation	1893	H. Dickinson ..	100, 200 & 400	50~, 1-ph. 2 & 3-ph.	15,440	9,560	..	£987,004	10,813 KW.	660 arc, 2,2 mtl.	2,965=17,670 H.P.	..	26,626
224	LEEK	Leek Urban District Council..	1904	R. M. Carr ..	230 & 460	Direct ..	650	312	73.5 KW.	£28,444	289 KW.	..	574 H.P.	..	732 KW
225	LEICESTER	Leicester Corporation.. ..	1894	T. Robert Smith	100 & 200	50~, 1-ph.	4,400	2,340	..	£297,880	8,029 KW.	..	50=1,676 H.P.	..	9,279
226	LEIGH	Leigh Corporation	1899	Arthur T. Smith	220 & 440	Direct ..	760	471	132 KW.	£46,000 (estd.)	700 KW.	..	180=1,100 H.P.	..	1,444
227	LEITH	Leith Corporation	1899	A. P. Rutherford	230 & 460 tr. 500	Direct ..	3,450	2,185	75 KW.	£163,677	2,685 KW.	337 arc, 2 mtl.	520=4,165 H.P.*	72=2,160 H.P.	6,605
228	LETCHWORTH	First Garden City Co., Ltd. .	1907	Charles Gould ..	250 & 500	Direct ..	580	250	150 KW.	£20,000	50 KW.	..	60=250 KW.	..	330 KW
229	LEWES	Lewes & District Electric Supply Co. Ltd.	1901	H. J. Williams..	230 & 460	Direct ..	330	145	92 KW.	..	405 KW. (approx.)	..	25=134 H.P.	..	552 KW
230	LEYTON	Leyton Urban District Council	1896	F. Harman Lewis	150 & 300 tr. 500	Direct ..	3,140	1,050 lg. 910 tr.	64 KW.	£179,203	2,080 KW.	82 arc, 819 cbn., 687 mtl.	85=232 H. P.	120=3,600 H.P.	5,700
231	LIMAVADY	Limavady Power & Light Works	1897	E. J. S. Ritter ..	110 & 220	100~, 1-ph.	60	50	..	..	50 KW.	..	..	..	50 K
232	LIMERICK	Limerick Corporation ..	1902	P. T. M'cN amara	230	Direct ..	400	275	96 KW.	£35,000	..	61 arc, 1 mtl.	..	..	500 KW

~=cycles per second; lg. = lighting; pb. lg. = public lighting; pr. = power; htg. = heating; inc. = incandescent; cbn. = carbon; mtl. = metal filament; N. = Nernst; A. = amperes; A.H. = ampere-hours; ph. = phase;

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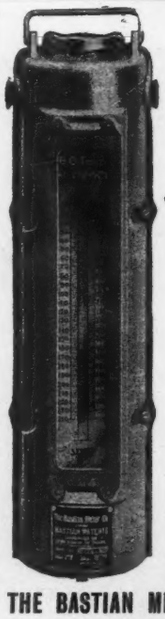

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..	641 KW. ..	53.6 KW.	2; pr. 2½ & 1, or 2, or 70/- + 2	flat rate w. rebates			
..	2,316 KW.	..	Lg. 7 & 3, or 6; pb. lg. 4; pr. 3 & 1½, & special	Max. demand, flat rate & contracts	242,701*	*to March 31, 1911. Data to Mar. 31, 1912	191
..	4,560 KW.	263 KW.	Lg. 4; pb. lg. £1 7s. per lamp per season; pr. 2 less dis.	Flat rate with discounts	..	*Bulk supply from Durham Col. Elec. Pr. Co., Ltd. Dist. by Newcastle-on-T. Elec. Supply Co., Ltd.	192
..	4,560 KW.	263 KW.	Lg. 5½, or 7 & 4; pr. 3 & 1 ..	Flat rate and max. demand	1,139,328	Data to Dec. 31, 1911	193
..	198 KW. ..	13 KW.	Lg. 7 & 4, or 5; pb. lg. 2; pr. 5 & 2, or 3½ (2, time-switch).	Max. demand, flat rate & time switch	53,371	*Bulk supply from Brighton Corporation. Data to Mar. 31, 1912	194
..	1,691 KW.	..	Lg. 7 & 3, or 5½; pb. lg. 3½; pr. 3 & 1½, or 2	Max. dem., flat, sl. scale, 2-rate & t.s.	401,602	.. ..	195
..	12,049 KW.	50.9 KW.	Lg. 4; pb. lg. arc £17½, inc. 33s. p.a., pr. 2 & 1 (3-ph., 1 w. dis.)	Flat rate w. dis., sl. scale, cont. & spl.	5,900,300	*100 & 200 v. 1-ph.; 400 v., 3-ph. †539=1765 H.P. 1-ph.; 220=4,066 H.P. 3-ph. Data to Dec. 31, 1911	196
..	11,788 KW.	..	Lg. 5 & 1½, or 4; pb. lg. arc £22, N. £6; pr. 2 to 1, w. discount	Max. dem., flat, sl. sc. w. dis., cont., t. sw.	5,303,726	Data to Mar. 31, 1910	197
62=1,300 H.P.	4,899 KW.	180 KW.	Lg. 6 & 1, or 3½; pb. lg. arc £18 & £9* p.a.; pr. 2 to 1, or 2 & 1; tr. 1.125†	Max. demand, flat rate, & sl. scale	3,422,782	Lighting & traction. *Inc., £3½ p.a.; 32 C.P. cbn. or 50 an. 60 C.P. mil. †Htg. 1½ & 1. Data to Mar. 31, 1912	198
..	615 KW.	68 KW.	Lg. 7 & 3, or 6; pr. 4 & 1½ ..	Max. dem., flat rate, and cont. w. dis.	176,412	Data to Dec. 31, 1911	199
26=650 H.P.	2,724 KW.	93 KW.	Lg. 3; pb. lg. 2½; pr. 2 to 1½; tr. 1	Flat rate w. dis. ..	706,444	*Supply in bulk from Derby & Notts Electric Power Co. Data to Mar. 31, 1912	200
..	85 KW. ..	..	Lg. 6; pb. lg. 2.9; pr. 3 to 1 ..	Flat rate, sliding scale and contract	18,000 (approx.)	Water power. Data to Mar. 31, 1912	201
..	967 KW. ..	105 KW.	Lg. 7 & 3, or 6; pr. 4 & 1½, or 2½	Max. demand and flat rate	413,654	Data to Dec. 31, 1911	202
72=1,800 H.P.	3,791 KW.	995 KW.	Lg. 4 less 5% cash; pb. lg. 1.863; pr. 2 to 1½; tr. 1.375	Flat rate	2,050,885	Lighting and traction. Data to Mar. 31, 1912	203
..	113 KW. ..	..	Lg. 6; pb. lg. 3; pr. 3; hg. 1½	Flat rate	37,960	*Resident engineer, J. H. Dennison. Data to Dec. 31, 1909	204
24=720 H.P.	1,366 KW.	..	Lg. 7 & 2, or 4½ to 4; pb. lg. 1.78; pr. 2 to 1; tr. 1.75	Max. dem., flat, sl. scale & cont. w. dis.	522,433	Lighting and traction	205
..	244 KW.	..	Lg. 6; pr. 2½ to 1½	Flat rate	55,594	Part gas power. Data to Mar. 31, 1910	206
..	237 KW.	..	Lg. 6; pb. lg. contract; pr. 3 ..	Flat rate	53,568	Part water power.	207
..	1,602 KW.	234 KW.	Lg. 4½ (arc 3 & 3½*); pb. lg. arc £17†; pr. 2 to 1; htg. 1	Flat rate, sl. sc., & max. dem. w. dis.	1,062,598	*Or for domestic purposes £12 p.a. per KW. (max.d.) & 1 p.u.† Inc. £5 5s. all ngt.; £3 3s. ½-ngt. Data to Mar. 31, '12	208
..	151 KW.	..	Lg. 6; pb. lg. £226 p.a.; pr. 3 to 2½	Flat rate with discount	58,400	.. ..	209
26=680 H.P.	2,319 KW.	..	Lg. 7 & 2½ (ave. max. 4½) w. discount; pr. 4½ & 1½	Max. demand w. dis., & 2-rate mr.	1,042,194	Lighting and traction. Data to Dec. 31, 1907	210
..	230 KW.	..	Lg. 5; pr. 2½	Flat rate	..	.. ..	211
..	150 KW. ..	..	Lg. 6d. with discounts	Flat rate	..	100-H.P. turbine and alternator being installed. Data to April 14, 1910	212
..	350 KW. ..	5 KW.	Lg. 6; pb. lg. 2/- per lamp p.a.; pr. 4	Flat rate	55,071	Data to Dec. 31, 1911. Residential district	213
28=730 H.P.	2,110 KW.	1,022 KW.	Lg. 4½ w. dis.; pb. lg. £761; pr. 2 w. dis. to 2½; tr. 1½; htg. 1½	Sliding scale and flat rate	1,145,289	Lighting and traction. Data to May 15, 1912	214
..	14.5 KW.	..	Lg. 7 & 2, or 5; pb. lg. £5½ & £3; pr. 4 or 3 & 1	Max. demand and flat rate	19,845	*Eng.-in-chief, E. T. R. Murray. Data to Dec. 31, 1911	215
..	1,104 KW.	60 KW.	Lg. 4; pb. lg. 2.28; pr. 3 to 1; htg. 1½	Flat rate and max. demand* & spl.	78,757	Part gas power. *Pr. max. demand; flat rate in daytime. †470 50-c.p., 18 300-c.p. Data to Mar. 31, 1912	216
..	2,015 KW.	515 KW.	Lg. 5, or 7 & 3; pb. lg. arc £20, 32-C.P. inc. £3½ p.a.; pr. 1½	Max. demand and flat rate	871,089	*Ex. street lg. †Two 32-C.P. inc. used after midnight. Data to Mar. 31, 1912	217
44=1,232 H.P.	..	..	Lg. 4½ to 3; pb. lg. arc £12 p.a.; pr. 1½ to ¾; tr. 1½	Sliding scale ..	1,572,856	Lighting and traction. Data to May 15, 1909	218
24=640 H.P.	2,008 KW.	..	Lg. 4½ (5% dis.); pb. lg. 1.5; tr. 1.7*	Flat, sl. sc., 2-rate & cont. w. dis. & t.sw.	808,927	Lg. & tr. Gt. incr. in pr. & domestic loads. *Pr 2½ & 1½ & £3 7s. p. B.H.P. plus ½d. p.u (5% dis.) Data to Mar. 31, '12	219
..	100 KW. ..	..	Lg. 3 to 1½; pb. lg. 2½ inclusive	Flat rate, contract and special	..	.. ..	220
..	1,104 KW.	102 KW.	Lg. 6 & 2½, or 5½*; pr. 2½ or £5 p. H.P. p.a. & 1½ p.u.	Max. demand, flat rate, 2-rate & t. sw.*	218,307	*Time switch and 2-rate meter, 6d. and 2½d. Data to Dec. 31, 1912	221
..	484 KW...	..	Lg. 6½ to 5 (2-rate 5 & 3*); pr. 3 to 2½, or £14 per KW. p.a. + 2 p.u.	Flat rate, sl. scale, & 2-rate meter.	175,769	*Or 12/- per 32-w. lamp p.a. Diesel oil engines. Data to Dec. 31, 1911	222
..	26,626 KW.	2,780 KW.	Lg. 4 & 1; pb. lg. 1½; pr. 1½ to 0.75 (less 5%)	Special scale* and max. demand	17,841,572	*Lg., 4d. first 1,000 hrs. use of lamps, 1d. after; pr. max. demand. Data to Mar. 31, 1912	223
..	782 KW...	97.4 KW.	Lg. 7 to 3, or 6½ to 4; pr. 2 to 1.35	dax. dem., flat, sl. sc., t.sw., 2-r. mtr. & cont.	532,416	Producer gas power (pressure type), using bituminous fuel. 1 Diesel engine. Data to Mar. 31, 1912	224
..	9,279 KW.	425 KW.	Lg. 4 & 3½; pr. 2 to 0.72; htg. & ckg. 1	Flat rate & sl. scale	2,849,163	Data to Dec. 31, 1911	225
..	1,444 KW.	..	Lg. 7 & 2, or 4½; pr. 3½ & 1; all less 5%	Max. demand & flat rate	809,275	Data to March 31, 1910	226
72=2,160 H.P.	6,605 KW.	..	Lg. 2½ w. dis.; pb. lg. arc £.4, £10½ & £7; pr. 1½ w. dis.; tr. ¾	Flat rate, with discounts	3,442,227 May 15 '11	Lighting & traction. *Also 85 radiators=96 KW. Data to Mar. 31, 1912	227
..	300 KW.	150 KW.	Lg. 8, & 1½ or 5; pr. 1½	Max demand, flat rate, & special*	254,889	*20% of output supplied to the Co. for pumping, at ⅝d. per unit. Data to Sep. 30, 1911	228
..	552 KW...	76 KW.	Lg. 7 & 2½, or 5; pr. 4½ & 1½, or 2½	Max. demand & flat rate	157,798*	*During 1911. Data to April 25, 1912	229
120=3,600 H.P.	5,700 KW.	..	Lg. 5 & 2, or 4*; pr. 3 & 1, or 1½; tr. 1½	Max. demand & flat rate	3,533,398	Lighting and traction. *Pb. lg. arc £21, inc. £4.3.6 (two 40-C.P.) per annum. Data to Mar. 31, 909	230
..	50 KW.	..	10s. per 8-C.P., or 6d. per unit ..	Contract or flat rate	..	Water power. Data to May, 1912	231
..	500 KW...	..	Lg. 5; pr. 3 & 1½	Flat rate with discounts	260,000	Producer gas power. Data to Dec. 31, 1909	232

421 TRAFFORD PARK ..
422 TREETON .. ..
423 TUNBRIDGE WELLS ..
424 TWICKENHAM, HAMPTON & TEDDINGTON*
425 TYNEMOUTH .. ..
426 UXBRIDGE AND DIST.
427 VENTNOR, BONCHURCH AND ST. LAWRENCE
428 WADEBRIDGE .. ..
429 WAKEFIELD .. ..
430 WALLASEY .. ..
431 WALSALL .. ..
432 WALTHAMSTOW ..
433 WALTON-ON-NAZE ..
434 WARRINGTON .. ..
435 WATFORD .. ..
436 WEDNESBURY .. ..
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438 WEST BROMWICH ..
439 WEST HAM .. ..
440 WEST HARTLEPOOL ..
441 WESTON-SUPER-MARE
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443 WEYMOUTH & MELCOMBE REGIS
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456 WOLVERHAMPTON ..
457 WORCESTER .. ..
458 WORKSOP .. ..
459 WORMIT .. .. ..
460 WORTHING .. ..
461 WREXHAM .. ..
462 YARMOUTH .. ..
463 YORK .. .. ..
464 YSTRADCYNLAIS ..

hours; ph. = phase; A.C. = alternating current; D.C. = direct current.

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	LONDON.												
233	LINCOLN	Lincoln Corporation	1898	Stanley Clegg	230 & 460 tr. 500	Direct	1,395	1,008 lg. 100 tr.	34.5 KW.	£68,174	1,266 KW.	36 arc, 87 mtl. 2 N.	22
234	LIVERPOOL	Liverpool Corporation	1883	A. B. Holmes (Con.) A. Clough (Res.)	230 & 460, tr. 525	Direct	37,000	19,820		£2,154,323	20,700 KW.	183 arc, 945 inc.	2,890
235	LLANDILO	Llandilo Urban District Council	1902	T. Bowen	230	Direct	120	45	23 KW.	£8,000		72 cbn., 24 mtl.	5=1
236	LLANDRINDOD WELLS	Llandrindod Wells Electric Light and Power Co., Ltd.	1897	J. Brown	230 & 460	Direct	260						
237	LLANDUDNO	Llandudno Urban District Council	1898	H. Morton	220 & 440	Direct	1,800	1,128	54 KW.	£52,615	1,041 KW.	51 arc	155
238	LLANGOLLEN	Llangollen & District Electric Light and Power Co., Ltd.	1904	E. Bremner Smith	220	Direct	70	37	120 A.	£2,833		6 arc, 80×2 mtl.	2=8
239	LLANRWST AND TREFRIW	Llanrwst Electricity Supply Co., Ltd.	1899	J. H. Targett	220	Direct	156	49	33 KW.	£9,742	109 KW.	94 mtl.	7=1
240	BATTERSEA	Battersea Borough Council	1901	F. A. Bond	230 & 460	Direct	3,592	2,735	500 KW.	£296,000	3,796 KW.	715 mtl.	3,862
241	BERMONDSEY	Bermondsey Borough Council	1902	W. E. J. Heenan	240 & 480	Direct	2,225	1,445	70 KW.	£165,000	1,363 KW.	172 arc, 217 mtl., 51 N.	500=8
242	CHELSEA	Chelsea Electricity Supply Co., Ltd.	1889	Percy Still	200 & 400	Direct	3,500	2,806		£490,023			
243	CITY OF LONDON	City of London Electric Lighting Co., Ltd.	1891	F. Bailey	204 & 410 D.C., 204 A.C.	Direct & 100~, 1-ph.	55,000	18,418 Jan., 1912		£2,145,966			
244	FINSBURY	County of London Electric Supply Co., Ltd.	1897	C. P. Sparks	104 A.C., 580 D.C.	50~, 1-ph., & direct	9,000	5,000		£1,703,959*	*		
245	FULHAM	Fulham Borough Council	1901	Arthur J. Fuller	200	50~, 2-ph.	4,450	2,064			3,435 KW.	202 arc, 1,056 mtl.	237=1
246	GREENWICH, LEWISHAM PENCE & SYDENHAM*	South Metropolitan Electric Light & Power Co., Ltd.	1900	H. W. Bowden (Man. Dir. & Eng.)	200	50~, 2-ph.	6,000	3,810					
247	HACKNEY	Hackney Borough Council	1901	L. L. Robinson	240 & 480	Direct	4,800	3,642	300 KW. for 3 hrs.	£360,000 (est.)	4,680 KW.	499 arc, 2 mtl.	775
248	HAMMERSMITH	Hammersmith Borough Council	1897	G. G. Bell	110 & 220	50~, 1-ph.	10,000	5,828		£344,040		254 arc, 801 mtl.	483=8
249	HAMPSTEAD	Hampstead Corporation	1894	G. H. Cottam	105 & 210	90~, 1-ph.	5,190	3,237		£390,930	10,624 KW.	122 arc, 12 mtl.	97=8
250	ISLINGTON	Islington Borough Council	1896	Albert Gay	100, 200 & 400	50~, 1-ph.	6,500	4,218	30 KW. for 3 hrs.	£513,462	5,440 KW.	644 arc, 45 mtl.	712=
251	KENSINGTON	Brompton and Kensington Electricity Supply Co., Ltd.	1889	R. S. Downe (Gen. Man.)	100	83~, 1-ph.	3,050	2,001		£280,648		16 arc	89=8
252	KENSINGTON (N. OF HIGH STREET)	Notting Hill Electric Lighting Co., Ltd.	1891	Geo. Schultz	200	Direct	3,000*	1,696	300 KW.	£247,467	6,348 KW.	52 arc	77=2
253	KENSINGTON AND KNIGHTSBRIDGE	Kensington & Knightsbridge Electric Lighting Co., Ltd.	1887	H. W. Miller	200 & 400	Direct	6,300*	3,887	1,100 KW.	£386,550	12,956 KW.	44 arc	239=1,
254	KENSINGTON AND NOTTING HILL	Jt. Cttee. of K. & Knightsbridge & Notting Hill E. L. Cos.	1900	H. W. Miller and G. Schultz	5,250	48~, 3-ph.	9,000	3,943	15 KW.	£224,340			
255	LAMBETH	South London Electric Supply Co., Ltd.	1899	H. W. Sprunt	220	50~, 1-ph.	5,000	2,800		£385,997	5,720 KW.	25 arc	641= H.P
256	LONDON* & WESTMINSTER	London Electric Supply Corporation Ltd.	1885	G. W. Partridge	105 & 210 A.C. 230&460 D.C.	85~, 1-ph., & direct†	17,250	12,000		£1,299,251	9,000 KW.	63 arc	6,950
257	MARYLEBONE	Marylebone Borough Council	1897	A. Hugh Seabrook (Gen. Man.)	240 & 480	Direct	12,000	8,748*	3,800 KW.	£2,031,160	15,286† KW.	90 arc, 3,521 mtl.	1,024 H
258	MID LONDON, PADD'TON ACTON, HANWELL*	Metropolitan Electric Supply Co., Ltd.	1887	J. S. Highfield (Eng. and Man.)	100 & 200	60~, 1-ph. & 2-ph. & d.	19,650	8,468† (inc. bulk)	2,400 KW.	£1,989,882	20,941 KW.	98 mtl.	1,344 KW. (in
259	POPLAR	Poplar Corporation	1900	J. H. Bowden	230 & 460	Direct	4,200	2,000	180 KW.	£280,654	3,628 KW.	342 arc, 556 mtl.	549= H
260	ST. JAMES' WESTMINSTER	St. James & Pall Mall Electric Light Co., Ltd.	1889	S. T. Dobson	110 & 220	Direct	10,460	5,724	296 A.	£433,210	10,430 KW.		2,674 K
261	ST. PANCRAS	St. Pancras Borough Council	1891	S. W. Baynes	110, 220 & 440	Direct	8,280	4,268		£611,387	8,237 KW.	947 arc	871 KV 942=4,
262	SHOREDITCH	Shoreditch Borough Council	1897	C. Newton Russell	240 & 480	Direct	6,055	2,875		£376,817	4,150 (approx.)	323 arc, 253 mtl.	5,500 (app
263	SMITHFIELD MARKETS	Smithfield Markets Electric Supply Co., Ltd.	1897	E. Dowling	100 & 200	Direct	1,040	550	105 KW. (10 hrs.)	£114,326	488 KW.	994 mtl.	41=51
264	SOUTHWARK	Southwark Corporation	1899	D. M. Kinghorn	220 & 440	Direct	1,762	1,185	770 KW.	£101,631 (estd.)	1,729 KW.	99 arc, 4 cbn., 159 mtl.	133=6
265	STEPNEY	Stepney Borough Council	1899	W. C. P. Tapper	240 & 480	Direct	7,720	5,880	50 KW.	£434,280	4,436 KW.	474 arc, 130 mt.	1,310= H.
266	STOKE NEWINGTON	Stoke Newington Corporation	1902	S. Hann	240 & 480	Direct	315*	300	55 KW.	£35,755	509 KW.	9 arc	40=15
267	WANDSWORTH	County of London Electric Supply Co., Ltd.	1897	C. P. Sparks	205 & 410	50~, 2-ph.	7,500	4,850		£1,703,959*	*		
268	WESTMINSTER	Westminster Electric Supply Corporation, Ltd.	1891	Sir A. B. W. Kennedy	200 & 400	Direct	17,899*	10,679		£1,224,404	5,260 KW.	966 arc, 213 inc.	10,077 & h
269	WESTMINSTER & ST. JAMES	Central Electric Supply Co., Ltd.	1902	Sir A.B.W.Ken'dy S. T. Dobson*	6,000	50~, 3-ph.	12,930	8,681	450 A.H. (stn. ltg.)	£585,621			
270	WESTMINSTER, HOLBORN & CITY OF L.	Charing Cross, West End & City Electricity Supply Co.	1891	H. W. Kingston	100, 200 & 400*	Direct	20,670	13,400	3,075 KW. (normal)	£2,306,118	24,977 KW.	166 arc	17,160
271	WOOLWICH, PLUMSTEAD & ELTHAM	Woolwich Corporation	1893	G. W. Keats	210 & 420*	Direct*	1,728	737		£163,965	1,372 KW.	77 arc, 154 inc., 18 Nernst	320
272	LONDONDERRY	Londonderry Corporation	1894	R V. Macrory	220 & 440	Direct	700	494	500 A.H.	£54,532	591 KW.	185 arc, 97 cbn. 8 mtl.	72=46
273	LONG EATON	Harrington Electric Light Co., Ltd.	1897	W. B. Smith	115	Direct	210	120		£5,480	138 KW.		
274	LONG EATON	Long Eaton Urban District Council	1903	F. Worrall	220	Direct	450	242		£22,864	463 KW.	2 arc, 290 inc., 92 Nernst	57=144
275	LONGTON	Stoke-on-Trent Corporation	1901	C. H. Yeaman	230 & 460	Direct	600	291	22 KW.	£31,983	390 KW.	28 arc	248 KW
276	LOUGHBOROUGH	Loughborough Corporation	1904	W. H. Allen	230 & 440	Direct	760	440	166 KW.	£35,328	491 KW.	12 clusters, 4 × 40-c.p. mtl.	120=5
277	LOWESTOFT	Lowestoft Corporation	1901	G. A. Bruce	230 & 460	Direct	1,825	955		£95,349	1,633 KW.	576 mtl.	117=6
278	LUDLOW	Ludlow Electric Light Co., Ltd.	1907	Edwards and Armstrong	230	Direct	75	30	57.5 KW.	£4,020	70 KW.	2 mtl.	6=5½
279	LUTON	Luton Corporation	1901	W. H. Cooke	250 & 500	Direct	2,297	1,723	120 KW.	£80,331	1,333 KW.	12 arc, 27×50 c.p. mtl.	569=3,0
280	LYME REGIS	Lyme Regis Electric Light & Power Co., Ltd.	1900	F. Cheshire	110	Direct	70		38.5 KW.	£5,188	46 KW.	126 mtl.	4=18
281	LYMINGTON	Lymington Electric Light & Power Co., Ltd.	1900	C. L. Holman	240 & 480	Direct	150	108	54.6 KW.	£35,876	463 KW.	118 mtl.	81=186
282	LYNTON & LYNMOUTH	Lynton & Lynmouth Electric Light Co., Ltd.	1890	P. T. Kimmins	100	100~, 1-ph.	237	92		£8,000	165 KW.	105 mtl.	8=18½
283	MACROOM	Macroom Electric Light Co.*	1899	D. E. McDonnell	230	100~, 1-ph.	150	47			67 KW.	87 inc.	
284	MAIDENHEAD & DISTRICT	Maidenhead Corporation	1902	C. O. Milton	230	Direct	550	370	100 KW.	£50,000	700 KW. (about)	55 arc, 200 mtl.	33=150
285	MAIDSTONE	Maidstone Corporation	1901	E. E. Hoadley	230 & 460, tr. 500	Direct	1,250	751 lg. 180 tr.	150 KW.*	£81,000	1,107 KW.	29 arc, 440 mtl., 210 N.	1,556 H
286	MALTON & NORTON	Northern Counties Electricity Supply Co., Ltd.	1904	A. E. Squires (Res.)*	230 & 460	Direct	186	88			186 KW.	15 KW.	96 KW.
287	MALVERN	Malvern Urban District Council	1904	W. J. Rendell Baker	100 & 200	50~, 1-ph.	250	108		£21,000	463.9 KW.		14=33.
288	MANCHESTER	Manchester Corporation	1893	S. L. Pearce	100, 200, & 400 D.C.*	Direct, and 50~, 3-ph.*	54,800	42,025	6,000 KW. (approx.)	£2,792,403	28,497 KW.	114 arc	5,421= H.E
289	MANSFIELD	Mansfield Corporation	1903	E. Holcombe Hewlett	240 & 480 tr. 550-600	Direct	1,200	373 lg. 508 tr.	280 KW. (1 hour)	£77,733*	693 KW.	40 arc, 24 mtl.	127=44
290	MARDY (GLAM.)	Mardy Electric Light Co., Ltd.	1898	E. A. Davies	220*	Direct	60	49	12 KW.	£3,000	133 KW.	2 arc, 60 mtl.	5=10 H
291	MARGATE & BROADSTAIRS & S. PETERS	Isle of Thanet Electric Tramways & Lighting Co., Ltd.	1903	J. A. Forde	240 & 480, tr. 500	Direct	1,600	1,200	77 KW.		1,079 KW.	25 arc, 30 mtl.	72=216
292	MARKET DRAYTON	Market Drayton Electric Light & Power Co., Ltd.	1903	S. Lambert.	240 & 480	Direct	90	73.8	43.2 KW.	£16,565 (1910)	248 KW.		111.5 inc.
293	MELTON MOWBRAY	Melton Mowbray Electric Light Co., Ltd.	1900	J. E. Edmundson	240 & 480	Direct	200	171	86 KW.	£40,640	465 KW.		65=190
		Electric Supply Corporation,	1904	K. A. Scott-	235 & 450	Direct	66	21	35 KW.	£10,230	80 KW.	2 cbn., 44 N.	12=31

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THE UNITED KINGDOM.

	Public lighting.	No. and H.P. of private motors.	No. and H.P. of traction motors.	Total connections of all kinds.	Increase during year.	Price charged per unit, pence.	System of charging.	Units sold during last complete year.	Remarks.	
.	36 arc, 87 mtl. 2 N.	264=1,984 H.P.	16=420 H.P.	3,188 KW.	7.5%	Lg. 5 & 2½, or 4½ (ch. 4); pb. lg. 5 & 2½ net; pr. 2 & 1, or 2½, ½; tr. 1½	Max. dem., flat w. dis., sl. sc., 2-rate, t.s.& spl.	1,840,167	Lighting and traction. Data to Mar. 31, 1912	233
.	183 arc, 945 inc.	2,890=18,482 H.P.	Abt. 450 cars, each 50 H.P	28,918 KW. (ex. tr.)	1,422 KW.	Lg. 3½, 3 & 2½*; pb. lg. 2 & 1; pr. 2, 1½ & 1; tr. ave. for 1911 1.056	Sliding scale & flat rate	87,765,203	Lighting and traction. *Also "rateable value" system. Data to Dec. 31, 1911	234
	72 cbn., 24 mtl.	5=10 H.P. ..	..	..	..	Lg. 6 w. dis.; pb. lg. 3; pr. 3 ..	Flat rate	36,500	Data to March 31, 1911	235
	..	..	..	..	..	Lg. 6; pr. 6 to 3½	Flat rate & scale ..	120,000	.. ..	236
.	51 arc ..	155 KW. ..	55½ KW. ..	1,678 KW.	82 KW.	Lg. 7 & 2, or 4½; pb. lg. 2½; pr. 2; tr. 1½ to 1	Max. demand, flat rate, con. w. dis.	1,057,252	Lg. & tr. 577,295 units sup'd to Llandudno & Colwyn Bay Lt. Rly. Co. for yr. Max. ld. in sum'r. Data to Mar. 31,'11	237
	6 arc, 80×2 mtl.	2=8 H.P. ..	..	..	..	Lg. 7 & 4; pb. lg. 3, & cont.; pr. 4 (min. 10s. per H.P. per qr.)	Max. demand & flat rate	27,364	.. ..	238
	94 mtl. ..	7=11¾ H.P.	..	117 KW.	10 KW.	Lg. 5; pb. lg. 28/- per 2×25 c.p. tant. to 11 p.m.; pr. 3	Sl. scale with dis., & contract	39,186	Data to Dec. 31, 1911	239
.	715 mtl. ..	3,362 H.P. ..	..	6,586 KW.	794 KW.	Lg. 3½ (arc 2½); pb. lg. £15 to 35s. p.a.; pr. 1 or £4 per KW. & ½ p.u.	Flat rate and max. demand	5,046,576	Data to Mar. 31, 1912	240
.	172 arc, 217 mtl., 51 N.	500=3,098 KW.	..	4,598 KW.	..	Lg. 6 & 2, 3½ or 1½ & 8½; arcs 2½; pb. lg. 1½; pr. 1½ & ½; rdrs. 1½	Max. dem.,fl. rate, sl. sc.; 2-r.mtr,t.sw.&spl.	3,183,691	Data to March 31, 1910	241
	..	..	..	8,477 KW.	315 KW.	Lg. 5½ & under; pr. 1½	Flat rate	4,016,478	Data to Dec. 31, 1911	242
	..	..	..	39,122 KW.	..	Average obtained, lg. & pr. 2.38; pb. lg. 1.66	Max. dem., flat rate, sl. sc. & 2-rate mtr.	23,683,759	Data to Dec., 1911	243
	..	*	..	32,388 KW.*	..	Lg. 5 (bus.), 5½; pr. 2½ to 1½; htg. 1½	Flat rate, sl. scale & contract	14,736,102*	Data to Dec. 31, 1909. *Jointly with Wandsworth.	244
.	202 arc, 1,056 mtl.	237=1,710 H.P.	..	5,355 KW.	..	Lg. 8½ (basst. 2, midnight to sunset); pb. lg. 1.2; pr. 1	Flat rate	3,512,236	Data to Mar. 31, 1912	245
	..	..	..	...	1,995 KW.	Lg. 6 w. dis.; pr. by agreement	Flat rate, & agreement with dis.	..	*Also Blackheath, Catford, C. Palace, &c., and parts of Lambeth & Camberwell. Data to Dec. 31, 1911	246
	499 arc, 2 mtl.	775=4,780 H.P.	..	8,275 KW.	968 KW.	Lg. 3½, or 6 & 1*; pb. lg. arc £13, £12½; pr. 1½†; htg. 1½ & 1	Max. demand, telephone & flat rate	6,633,000 (estimated)	*Also t'phone system, £2 p. KW. p. qr. & 1d. p.u. †Also £1 per KW. per qr. & ½d. p.u. Data to Mar. 31, 1912	247
	254 arc, 801 mtl.	483=5,202 H.P.	..	..	..	Lg. 3; pb. lg. arc £20 and £7½, inc. £12½ to £2 14 0 p.a.*;	Flat rate with dis.	9,329,893	*Pr. 1½ w. dis. Data to Mar. 31, 1912	248
.	122 arc, 12 mtl.	97=540 H.P.	..	11,546 KW.	..	Lg. 6 & 1½, or 4*; pb. lg. arc £26¼ p.a.; pr. 1 & 1½; htg. 1½	Max. demand and flat rate	4,421,527	* Arc lighting 3½d. & 1½d. Data to Mar. 31, 1909 ..	249
.	644 arc, 45 mtl.	712=3,880½ H.P.	..	9,101 KW.	995 KW.	Lg. 3½; pb. bldgs. 3; pb. lg. £11,000 p.a.; pr. 1	Flat rate	6,416,953	Data to Mar. 31, 1912	250
	16 arc ..	89=889 H.P.	..	9,084 KW.	440 KW.	Lg. 6 to 4 (shops &c. 3 to 2, bts. 3 to 2); pb. lg. 1; pr. 1	Flat rate with discounts	2,838,817	Data to Dec., 1911	251
	52 arc ..	77=290 KW.	..	6,638 KW.	309 KW.	Lg. 5 w. dis. to 20%; pb. lg. 1; pr. 2 to 1	Sliding scale or flat rate	2,197,720	*Inc. steam plant, battery & motor-generators. Bulk supply from Wood Lane Works. Data to Dec. 31, 1911	252
.	44 arc ..	239=1,420 H.P.	..	13,900 KW.	563 KW.	Lg. 5 to 3; pb. lg. 1; pr. 3 to 1	Flat rate & sl. sc. with discounts	5,821,514	*Motor-generators, 4,000 KW.; 1,800 KW. received from Wood Lane Works. Data to Dec. 31, 1911	253
	..	..	..	..	..	.. ..	..	9,693,399	Bulk supply to Cos. named; motor-genrs., 6,000 KW. in 5 sub-stns. Res. eng. C. M. Bennett. Data to Dec. 31,'11	254
	25 arc ..	641 = 3,945 H.P.	..	8,770 KW.	17 KW.	Lg. 7 & 2, or 4½; pr. spl. rates..	Max. dem., flat rate & contract	4,479,487	Data to Dec. 31, 1911	255
	63 arc ..	6,950 H.P. ..	(L. D. & S. C. Ry.)	14,819 KW.	..	Lg. 5½ to 3½, or 6 & 3; pb. lg. 1; pr. 1½ to ½	Sliding scale or max. demand	20,476,962	*Berm'sey, Ch'sea, D'ford, Gr'wich, So'wark, C'well, Fins'y & L'beth. †Also 25—, 3-ph. Tr. 6,600 v. Data to 31.12.'11	256
.	90 arc, 3,521 mtl.	1,024=2,883 H.P.	..	22,489 KW.	1,843 KW.	Lg. 6; (various tariffs)	M. d., s. sw., sl. sc., flat, cont. & tele.	13,500,000	*On feeders. †Exc. htg. & ckg. Data to Mar. 31, 1912	257
	98 mtl.	1,844=5,725 KW. (inc. htg.)	..	28,711 KW.*	1,997 KW.	Lg. 6 to 3; pr. 3 & ¾; trade 5 to 3; or fixed rate +2 & 1	Max. dem., flat, cont.,& 2-rate mtr.	13,567,500	*Also Southall, Greenf'rd & Brentford. †On L.T. feeders. Data to Dec. 31, 1912	258
	342 arc, 556 mtl.	549=7,096.6 H.P.	..	9,106 KW.	..	Lg. 5 & 3; pb. lg. 1½; pr. 1½, or £3 per KW. and 0.8d. p.u.	Max. demand, flat rate, cont. & spec.	5,845,692	Data to March, 1909	259
	..	2,674 KW., mtr. 871 KW., htg.	..	13,975 KW.	..	Lg. 5½ & 4 (basements 3); pr. 7/6 per h.p. per qtr., & 1	Flat rate & sliding scale	10,703,680	Motor-generators, 5,750 KW.; bulk supply from Central Electric Supply Co., Ltd. Data to Dec. 1, 1911	260
	947 arc ..	942=4,635 H.P.	..	12,633 KW.	..	Lg. 6 & 1½, or 4; pb. lg. 3; pr. 1	Max. demand and flat rate	7,585,952	3-ph. A.C. 5,000 volts. 50~ to sub-stations. Data to Mar. 31, 1909	261
	322 arc, 253 mtl.	5,500 KW. (approx.)	..	9,650 KW. (approx.)	1,000 (approx.)	Lg. 5 & 2, or 4; pb. lg. 1½; pr. £3 per H.P. & ¾d. p.u.; htg. 1	Max. demand, flat rate & cont. w. dis.	7,890,978	Data to Mar. 31, 1912	262
	994 mtl. ..	41=518 H.P.	..	848 KW.	5%	Lg. 6 to 2½*; pb. lg. 5½ & 3½; pr. 2½ to 1½	Flat rate & sl. scale	1,813,663	*Including wiring, maintenance, and carbon lamp renewals. Data to Dec. 31, 1911	263
	99 arc, 4 cbn., 159 mtl.	132=699 H.P.	..	2,521 KW.	443 KW.	Lg. 4 to 3, or 4 & 1, or 60/- p. KW. qr. & 1; pb. lg. £893½; *	Max. dem., flat, con. & special	1,790,988	Data to Mar. 31, 1911. *Pr. 20/- per KW. per qr.+½d. p.u.; or 2d.. flat rate; htg. 1	264
	474 arc, 130 mt.	1,310=11,428 H.P.	592 KW. bulk	16,082 KW.	2,646 KW.	Lg. 8 & 1, or 6 & 0.9; pb. lg. 6 & 0.9; pr. 1*	Max. demand and flat rate	11,972,955	*Or 5s. per H.P. per month, & ½d. per unit. Data to Mar. 31, 1912	265
	9 arc ..	40=150 KW.	..	720 KW.	117 KW.	Lg. 7 & 2, or 5; pr. 5 & 1, 4 & 1, or 3, 2	Max. dem., flat rate, 2-rate mr. & cont.	426,527	*Bulk supply at 10,000 v. from North Met. E. P. S. Co Supply also from Destructor. Data to March 31, 1912	266
	..	*	..	32,388 KW.*	..	Lg. 5 (bus.), 5½; pr. 2½ to 1½; htg. 1½	Flat rate, sl. scale & contract	14,736,109*	Data to Dec. 31, 1909. *Jointly with Finsbury	267
	966 arc, 213 inc.	10,077 KW. pr. & htg.	..	35,637 KW.	1,440 KW.	Lg. 5½, 4½ & 3½; pb. lg. arc £22 less 5%; pr. 1	Sliding scale and flat rate	18,049,133	*Of this 8,940 KW. in motor-generators; bulk supply from Central Elec. Supply Co. Data to Dec. 31, 1911	268
	..	..	..	..	..	Bulk supply	Flat rate	18,102,440	*Resident engineer, H. P. Gaze. Bulk supply to Westminster & St. James Cos. Data to Dec. 31, 1911	269
	166 arc ..	17,160 H.P....	..	37,848 KW. + bulk	7.0%	Lg. 5 to 3; pr. 3 to ¾	Flat rate, sliding scale & contract	27,118,199	*Bulk supply 1,000 v. Data to Dec. 31, 1911	270
	77 arc, 154 inc., 18 Nernst	320 H.P.	..	1,703 KW.	..	Lg. 7 & 2½, or 4; pr. 2 to 1½ ..	Max. demand, flat rate & scale	1,000,000	*200 v., A.C., 50~ 1-ph., for Eltham only	271
	185 arc, 97 cbn. 8 mtl.	72=462 H.P.	..	1,071 KW.	..	Lg. 6 & 1½, or 4½*; pr. 2 to 1; htg. 1	Max. dem., flat rate & sliding scale	711,869	*Pb. lg. arc £18 18s., inc. (82 c.p.) £3 4s. p.a. Data to Mar. 31, 1910	272
	..	..	..	161 KW.	..	Lg. 3½	Flat rate	..	.. ..	273
	2 arc, 290 inc., 92 Nernst	57=140 H.P.	..	698 KW.	..	Lg. 3½ to 2; pb. lg. 2; pr. 2½ to ¾	Flat rate & scale ..	..	.. ..	274
	23 arc ..	248 KW. ..	..	645 KW.	..	Lg. 8 & 2, or 6; pr. 2½ to 1 (all less 5%); htg. 1	Max. demand, flat rate & sl. scl. w. dis.	425,935	Data to Mar. 31, 1912	275
	12 clusters, 4 × 40-c.p. mtl.	120=584 H.P.	..	1,027 KW.	137 KW.	Lg. 4 (factories 3); pb. lg. 2½; pr. 1 & ¾ (½ special)	Flat rate, 2-rate mtr. with discounts	585,665	Data to Mar. 31, 1912	276
	576 mtl. ..	117=632 H.P.	40=1,000 H.P.	2,978 KW.	..	Lg. 4½; pb. lg. 3; pr. 2 & 1½; tr. 1½	Flat rate	1,292,650	Lighting & traction. Data to Sept. 30, 1911	277
	2 mtl. ..	6=53 H.P. ..	..	76 KW.	..	Lg. 7 with discounts; pb. lg. 4; pr. 4 & 2	Flat rate with discounts	18,100	Data to Dec. 1908	278
	12 arc, 27×50 c.p. mtl.	559=3,041 H.P.	24=564 KW.	4,878 KW.	1,078 KW.	Lg. 6 & 1½, or 3½; pb. lg. 2; pr. 2 to ¾; htg. ½; tr. 1½ to 1	Max. demand, flat rate & sl. scale	2,979,580	Data to March 31, 1912	279
	126 mtl. ..	4=18 H.P. ..	..	40 KW.	..	Lg. 6; pb. lg. 6; pr. 6	Flat rate & contract	23,100	Data to Mar. 31, 1912	280
	118 mtl. ..	31=126 H.P.	..	564 KW.	24 KW. dec.	Lg. 7 & 4, or 6; pb. lg. £2 13/6 & £2 3/6 p.a.; pr. 4 & 1½, or 2½	Max. demand, flat rate & contract	127,487	Data to Dec. 31, 1911	281
	105 mtl. ..	8=18½ H.P.	..	199 KW.	9 KW.	Lg. 5; pb. lg. inc. £3½ p.a.; pr. 2½	Flat rate, 2-rate mtr. and contract	170,409	Water power only. Data to Mar. 25, 1912	282
	37 inc. ..	..	..	77 KW.	..	Lg. 4½, or 1s. per c.p. p.a.; pb. lg. total £180 p.a.	Flat rate and contract	..	Part water power. *T. Smith, Astley, proprietor. ..	283
	55 arc, 200 mtl.	33=150 H.P.	..	820 KW. (about)	..	Lg. 5; pb. lg. arc £14½ to £10, inc. £22½ p.a.; pr. 2 to 1½; hg. 2	Max. dem., flat, 2-rate, con. & spcl.	502,000	Data to Mar., 1911	284
	29 arc, 440 mtl., 210 N.	1,556 H.P. ..	40=1,000 H.P.	2,362 KW.	217 KW.	Lg. 4 or 10/- per ±2 w. lamp p.a.; pb. lg. 1.25; pr. 1 to 2; htg. 1; ‡	Max.dem.cont.& flat rate; sl. sc. for pr.	2,133,151	Ltg. & tr. *Traction. †43 arcs repl. by mtl. ‡Or 6/8 per 32-w. lp. p a.+1d. p.u. Tr. 1.25. Data to Mar. 31, 1912.	285
	15 KW. ..	96 KW. ..	..	247 KW.	5.5%	Lg. 4½ to 6; pr. 1½ upwards, sl. scale	Flat rate & sliding scale	..	Norton supplied from Malton. *C.W. Fairweather (Mgr.). Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	286
	..	14=38.5 H.P.	..	492 KW.	..	Lg. 6, first 2½ units per 8-C.P. per qr., all above, 4; pr. 3	Special scale and flat rate	141,575	Data to Mar. 31, 1910	287
	114 arc ..	5,421=54,980 H.P.	See other Table	69,566 KW. (ex. tr.)	6,740 KW. (ex. tr.)	Lg. 3½ or £7 per KW. + 1½ p.u.; pb. lg. 1½; pr. 1½ to .7; tr. 1 aprx.	Max. dem., fl. rate, sl. scale.,t sw. & spl.	93,682,940	Lighting and traction, three stations. *Also 240 and 400 v. A.C.; tr. 600 v. D.C. Data to March 31, 1912	288
	40 arc, 24 mtl.	137=446 H.P.	44=1,306 H.P.	2,518 KW.	8.7%	Lg. 7 & 1 or 4; pr. 4 & 1; tr. 1½ to 1; htg. 1	Max. dem., flat, 2-rate, & time switch	1,127,139	Lighting & traction. *Incl. destructor, £13,400. Data to Mar. 31, 1912	289
	2 arc, 60 mtl.	5=10 H.P.	..	163 KW.	..	Lg. 4½; pb. lg. arc £12½ mtl. £3½ p.a.	Flat rate	60,000	Overhead mains. *Private lg. 220 volts 2-wire; public lg. 110 volts 3-wire. Data to April 15, 1910	290
	25 arc, 30 mtl.	72=216 H.P.	120=2,400 H.P.	1,220 KW. (ex. tr.)	162 KW.	Lg. 5 with discount; pb. lg. 2½; pr. 2½ with discount	Flat rate with discounts	1,725,358	Lighting and traction station. Data to Sept. 30, 1911	291
	..	111.5 KW., inc. htg.	..	360 KW.	11 KW.	Lg. 7 & 4; pr. 2½	Max. demand & flat rate	66,471	Data for 1911	292
	..	65=190 H.P.	..	695 KW.	35 KW.	Lg. 5½; pr. 4 & 1½, or 2½ ..	Lg. flat & contract; pr. m.d. & flat	251,211	Data to Dec. 31, 1911	293
	2 cbn., 44 N.	12=81 H.P.	..	111 KW.	..	Lg. 6; pb. lg. 3; pr. 3; hg. 1½	Flat rate	23,204	*Resident engineer S. Johnston. Gas power.	

273	LONG EATON	Harrington Electric Light Co., Ltd.	1897	W. B. Smith ..	115	Direct ..	310	120	..	£5,450	133 KW.	..		
274	LONG EATON	Long Eaton Urban District Council	1908	F. Worrall ..	220	Direct ..	450	242	..	£22,864	463 KW.	2 arc, 290 inc., 92 Nernst		
275	LONGTON	Stoke-on-Trent Corporation	1901	C. H. Yeaman ..	230 & 460	Direct ..	600	291	22 KW.	£31,983	390 KW.	23 arc ..		
276	LOUGHBOROUGH ..	Loughborough Corporation ..	1904	W. H. Allen ..	220 & 440	Direct ..	700	440	166 KW.	£35,328	491 KW.	12 clusters, 4 × 40-c.p. mtl.		
277	LOWESTOFT	Lowestoft Corporation ..	1901	G. A. Bruce ..	230 & 460	Direct ..	1,825	955	..	£95,349	1,638 KW.	576 mtl. ..		
278	LUDLOW	Ludlow Electric Light Co., Ltd.	1907	Edwards and Armstrong	230	Direct ..	75	30	57.5 KW.	£4,020	70 KW.	2 mtl. ..		
279	LUTON	Luton Corporation	1901	W. H. Cooke ..	250 & 500	Direct ..	2,297	1,723	120 KW.	£80,331	1,333 KW.	12 arc, 27 × 50 c.p. mtl.		
280	LYME REGIS	Lyme Regis Electric Light & Power Co., Ltd.	1909	F. Cheshire ..	110	Direct ..	70	..	38.5 KW.	£5,188	46 KW.	126 mtl. ..		
281	LYMINGTON	Lymington Electric Light & Power Co., Ltd.	1900	C. L. Holman ..	240 & 480	Direct ..	150	103	54.6 KW.	£35,876	463 KW.	118 mtl. ..		
282	LYNTON & LYNMOUTH	Lynton & Lynmouth Electric Light Co., Ltd.	1890	P. T. Kimmins	100	100~, 1-ph.	237	92	..	£8,000	165 KW.	105 mtl. ..		
283	MACROOM	Macroom Electric Light Co.*	1899	D. E. McDonnell	230	100~, 1-ph.	150	47	..	..	67 KW.	87 inc. ..		
284	MAIDENHEAD & DISTRICT	Maidenhead Corporation ..	1902	C. O. Milton ..	230	Direct ..	550	370	100 KW.	£50,000	700 KW. (about)	55 arc, 200 mtl.		
285	MAIDSTONE	Maidstone Corporation ..	1901	E. E. Hoadley ..	230 & 460, tr. 500	Direct ..	1,250	751 ltg. 180 tr.	150 KW.*	£81,000	1,107 KW.	29 arc, 440 mtl., 210 N.		
286	MALTON & NORTON	Northern Counties Electricity Supply Co., Ltd.	1904	A. E. Squires (Res.)*	230 & 460	Direct ..	186	88	..	..	186 KW.	15 KW. ..		
287	MALVERN	Malvern Urban District Council	1904	W. J. Rendell Baker	100 & 200	50~, 1-ph.	250	108	..	£21,000	463.9 KW.	..		
288	MANCHESTER	Manchester Corporation ..	1893	S. L. Pearce ..	100, 200, & 400 D.C.*	Direct, and 50~, 3-ph.*	54,800	42,025	6,000 KW. (approx.)	£2,792,403	28,497 KW.	114 arc ..		
289	MANSFIELD	Mansfield Corporation ..	1903	E. Holcombe Hewlett	240 & 480 tr. 550-600	Direct ..	1,200	373 lg. 508 tr.	280 KW. (1 hour)	£77,738*	693 KW.	40 arc, 24 mtl.		
290	MARDY (GLAM.) ..	Mardy Electric Light Co., Ltd.	1898	E. A. Davies ..	220*	Direct ..	60	49	12 KW.	£3,000	133 KW.	2 arc, 60 mtl.		
291	MARGATE & BROADSTAIRS & S. PETERS	Isle of Thanet Electric Tramways & Lighting Co., Ltd.	1903	J. A. Forde ..	240 & 480, tr. 500	Direct ..	1,600	1,200	77 KW.	..	1,079 KW.	25 arc, 80 mtl.		
292	MARKET DRAYTON ..	Market Drayton Electric Light & Power Co., Ltd.	1903	S. Lambert. ..	240 & 480	Direct ..	90	73.8	43.2 KW.	£16,565 (1910)	248 KW.	..		
293	MELTON MOWBRAY ..	Melton Mowbray Electric Light Co., Ltd.	1900	J. E. Edmundson	240 & 480	Direct ..	300	171	86 KW.	£40,640	465 KW.	..		
294	MELROSE	Electric Supply Corporation, Ltd.	1904	K. A. Scott-Moncrieff*	225 & 450	Direct ..	65	21	35 KW.	£10,390	80 KW.	2 cbn., 44 N.		
295	MERTHYR TYDFIL ..	Merthyr Electric Traction and Lighting Co., Ltd.	1901	L. W. Dixon ..	230 & 460	Direct ..	820	lg. 432, tr. 321	300 KW.	£55,393	656 KW.	1,427 mtl. ..		
296	MEVAGISSEY	Mevagissey Electric Supply Co., Ltd.	1896	F. Johnson ..	110	Direct ..	15	10.4	11 KW.	..	24 KW.	57 mtl. ..		
297	MEXBOROUGH	Mexborough Urban District Council	1902	John Senior ..	220 & 440	Direct ..	400	280	50 KW.	£23,600	440 KW.	22 arc, 221 cbn., 41 mtl.		
298	MIDDLESBROUGH ..	Middlesbrough Corporation ..	1901	Horace M. Taylor	230 & 440	Direct ..	1,600	1,238	176 KW.	£107,000	2,027 KW.	..		
299	MIDDLETON	Middleton Corporation ..	1902	S. Pauls	230 & 440 tr. 500	Direct ..	768	700	44 KW.	£40,255	235 KW.	18 arc, 36 cbn.		
300	MILFORD-ON-SEA ..	Milford-on-Sea Electric Supply Co., Ltd.	1906	L. Nicholson ..	230 & 460	Direct ..	100	..	240 A.H.	£8,000	..	..		
301	MINEHEAD AND DUNSTER	Minehead Electric Supply Co. Ltd.	1903	B. W. Gothard..	220 D.C. 110 & 220 A.C.	Direct, and 50~, 1-ph.	276	175	132 KW.	£22,614	275 KW.	5 arc, 126 mtl.		
302	MIRFIELD	Mirfield Urban District Council	1905	John Lomas ..	100 & 200	50~, 1-ph.	..	42.5	..	£5,200	..	56 mtl. ..		
303	MONMOUTH	Monmouth Corporation ..	1899	F. R. Windsor ..	100 & 200	60~, 1-ph.	123	69.8	..	£18,106	175 KW.	7 cbn., 290 mtl.		
304	MONTROSE	North of Scotland Electric Light & Power Co., Ltd.	1901	F. Barritt Hills	240 & 480	Direct ..	282	168	48 KW.	£39,888	441 KW.	20 H.C.P. lns., 12cbn.,315 mtl.		
305	MORECAMBE	Morecambe Corporation ..	1898	W. H. Hall ..	220	Direct ..	700	335	220 KW.-hrs.	£62,593	446 KW...	104 arc, 275 inc., 5 N.		
306	MORLEY	Morley Corporation	1898	J. E. Ellis ..	100 & 200	60~, 1-ph.	240	180	..	£29,300	475 KW.	15 arc, 71 mtl.		
307	MORPETH	Northern Counties Electricity Supply Co., Ltd.	1904	W.H. Bibby (Res.)*	230 & 460	Direct ..	60	59	..	..	152 KW.	..		
308	MOTHERWELL	Motherwell Corporation ..	1901	S. Williams ..	230 & 460	Direct ..	1,410	643	100 KW.	£66,904	765.5 KW.	60 arc, 597 inc., 62 Nernst		
309	MUSSELBURGH ..	Musselburgh & District Elec. Light & Traction Co., Ltd.	1904	A. A. Watkins ..	230 & 460, tr. 500	Direct ..	600	200 lg. 200 tr.	96 KW. lg. 200 KW. tr.	£55,223	303 KW.	20 arc ..		
310	NELSON	Nelson Corporation	1892	D. Helme ..	230 & 460	Direct ..	1,000	755	..	£75,251	..	..		
311	NEWBURY	Urban Electric Supply Co., Ltd.	1905	Herbert W. Bush	240 & 480	Direct ..	497	215	133 KW.	£54,909	497 KW.	..		
312	NEWCASTLE-EMLYN & DISTRICT	Newcastle-Emlyn & District Electric Supply Co., Ltd.	1909	J. R. Parkington & Co.	110	Direct ..	50	15	..	£1,700 (approx.)	..	54 mtl. ..		
313	NEWCASTLE-ON-TYNE	Newcastle & District Electric Lighting Co., Ltd.	1890	W. D. Hunter ..	240 & 480 D.C. 100 & 240 A.C.	80~, 1-ph., & direct	9,000	6,000	1,050 KW.	£596,980	..	..		
314	NEWCASTLE-ON-TYNE	Newcastle Corporation ..	1901	Ernest Hatton ..	240 & 480 tr. 550	Direct ..	5,150*	3,300*	1,200 KW.	£1,188,223 (approx.)	174 KW.	437 arc ..		
315	NEWCASTLE-ON-TYNE AND TYNESIDE	Newcastle-on-Tyne Electric Supply Co., Ltd.	1889	R. P. Sloan (Man.) J.S.Watson(Tech)	240 & 480 D.C. 440 A.C.*	40~, 3-ph., and direct	67,200	48,400	1,440 KW.	£2,119,114	7,814 KW.	38 KW. ..		
316	NEWCASTLE-UNDER-LYME	Newcastle-under-Lyme Corporation	1904	A. J. C. de Renzi	230	Direct ..	140	80	46 KW.	£9,700	160 KW.	..		
317	NEWMARKET AND EXNING	Newmarket Electric Light Co. Ltd.	1899	F. A. Simpson ..	210 & 420	Direct ..	500	303	54 KW.	£41,957	750 KW.	12 arc ..		
318	NEWPORT & COWES	Isle of Wight Electric Light & Power Co., Ltd.	1901 and 1903	A. E. Mayes	240 & 480	Direct ..	580	380	Nt. 48 KW. Cs.144 KW.	£90,689	1,045 KW.	30 arc, 62 cbn., 5 N.		
319	NEWPORT (MON.) ..	Newport Corporation	1895	A. Nichols Moore	100 & 200 A.C. 230&460 D.C.*	87.5~, 1-ph. & direct	4,100†	3,391	164 KW. for 10 hrs.	£290,000	3,889 KW.	168 arc, 300 mtl., 95 N.		
320	NEWQUAY	Newquay Electric Light & Power Co., Ltd.	1903	A. S. Hawkins ..	230 & 460	Direct ..	200	110	35 KW.	£17,500	330 KW.	10 cbn ,200 mtl.		
321	NEWTON ABBOT ..	Urban Electric Supply Co., Ltd.	1903	G. E. Smith ..	240 & 480	Direct ..	180	161	192 KW.	£44,736	401 KW.	20 arc, 288 mtl.		
322	NORTHALLERTON ..	Northallerton Electric Light & Power Co., Ltd.	1899	H. W. Milnes ..	220	Direct ..	205	75	32.7 KW.	£7,947 (wrtn. dn.)	132.5 KW.	32 arc, 84 mtl.		
323	NORTHAMPTON ..	Northampton Electric Light & Power Co., Ltd.	1891	G. H. Jackson ..	210 & 420	Direct ..	2,640	1,566	400 KW.	£166,980	3,560 KW.	..		
324	NORTHWICH	Northwich Electric Supply Co., Ltd.	1897	W. Boyd ..	220 & 440	Direct ..	415	206	229 KW.	£37,108	627 KW.	43 mtl. ..		
325	NORWICH	Norwich Corporation.. ..	1893	F. M. Long ..	220 & 440	Direct ..	3,504	2,850	800 KW.	£299,306	4,228 KW.	20 arc ..		
326	NOTTINGHAM	Nottingham Corporation ..	1894	H. Talbot ..	200 & 400 tr. 500	Direct ..	10,851	6,558	100 KW.	£478,627	..	80 arc ..		
327	NUNEATON	Nuneaton Corporation ..	1900	S. C. Gibson ..	220 & 440	Direct ..	800	494	141 KW.	£41,793	..	20 500 c.p., 134 50to75 c.p.,mtl.		
328	OBAN	Oban Corporation	1903	Duncan McLellan	230 & 460	Direct ..	180	109*	69 KW.	£24,377	292 KW.	33 arc, 126 mtl.		
329	OGMORE VALLEY ..	Ogmore Valley Electric Light & Power Supply Co., Ltd.	1891	A. E. Marks ..	210 to 220	40~, 1-ph., & direct	300	150	..	£8,958	120 KW.	210 inc. ..		
330	OLDHAM	Oldham Corporation	1894	S. W. Newington	210 & 420 tr. 500	Direct ..	5,282	3,818	..	£295,475	..	23 arc, 16 mtl.		
331	OSWESTRY	Oswestry Electric Light and Power Co., Ltd.	1896	E. B. Smith ..	230	Direct ..	225	106	6.6 KW.	£12,680	173 KW.	..		
332	OULTON BROAD ..	Oulton Broad Electricity Co...	1902	B. Barber ..	230	Direct ..	45	18	14 KW.	£3,900	88.5 KW.	32 inc. ..		
333	OXFORD	Oxford Electric Co., Ltd. ..	1892	F. H. Francis ..	100	Direct, & 50~, 3-ph.	1,550	1,226	90 KW.	£196,001	3,142 KW.	32 arc, 48 mtl.		
334	PAIGNTON	Paignton Electric Light and Power Co., Ltd.	1908*	F. E. Frampton	220 & 440; tr. 500-550	Direct ..	620	78.2	53 KW.	£18,000	207 KW.	14 arc, 32 mtl.		
335	PAISLEY	Paisley Corporation	1899	C. F. Parkinson..	200 A.C. tr. 550 D.C.	50~, 1, 2 & 3-ph., & direct	2,400 lg. 1,800 tr.	1,005 D.C. 1,086 A.C.	..	£196,545 (1911)	2,874 KW.	95 arc, 18 mtl.		
336	PARTICK	Partick Corporation	1902	W. Sillery ..	240 & 480	Direct ..	2,450	1,590	150 KW.	£144,500 (approx.)	1,601 KW.	324 arc, 753 cbn., 220 mtl.		
337	PEMBERTON	Wigan Corporation	1902	James Slevin ..	230 & 460 tr. 550	Direct ..	900	127 lg. 982 tr.	75 KW.	£43,549	120 KW.	12 arc, 34 cbn., 206 mtl., 30 N.		
338	PEMBROKE (DUBLIN)..	Pembroke Urban District Council	1900	S. L. R. Price ..	220 & 440	Direct ..	600	389	192 KW. for 2½ hrs.	£74,000	..	43 arc, 283 mtl.		
339	PENARTH	Penarth Electric Lighting Co., Ltd.	1901	H Cameron ..	230, 460 & 500	Direct ..	580	380	40 KW.	..	771 KW.	110 mtl. ..		
340	PENRITH	Penrith Electric Supply Co., Ltd.	1909	Dundas Fox ..	110 & 220	Direct ..	100	55	55 KW.	£6,500	60 KW.	..		
341	PERTH	Perth Corporation	1901	J. Lambert ..	230 & 460	Direct ..	1,175	700	276 KW.	£60,014	916 KW.	101 arc, 57 mtl.		
342	PETERBOROUGH ..	Peterborough Corporation ..	1900	J. C. Gill ..	200 & 400	Direct ..	840	522	72 KW. lg. 72 KW. tr.	£58,402	801 KW.	119 arc, 4 cbn., 144 mtl.		
343	PLYMOUTH	Plymouth Corporation ..	1899	E. G. Okell ..	100 & 200 tr. 500 D.C.	50~, 1-ph. D.C. for tr.	2,800	1,480	237 KW. for 5 hrs.	£155,340	2,250 KW.	80 arc ..		
344	PONTYPOOL	Pontypool Electric Light & Power Co., Ltd.	1898	G. Elwell ..	103	Direct ..	169	138	21 KW.	£11,412	125 KW. (approx)	6 arc ..		
345	PONTYPRIDD	Pontypridd Urban District Council	1905	J. E. Teasdel ..	230 & 460 tr. 500	Direct ..	900	788	495 KW.	£68,527	618 KW.	39 arc ..		
346	PORLOCK	Porlock & District Electric Supply Co.	1912	W. J. Smither ..	200	Direct ..	21	12	7 KW.	£2,500	19.8 KW.	22 mtl. ..		
347	PORTPATRICK ..	Portpatrick Electric Supply Co., Ltd.	1904	..	200 & 400	Direct ..	50	..	..	..	..	..		
348	PORTSMOUTH	Portsmouth Corporation ..	1894	W. S. Foale ..	100	50~, 1-ph.	4,450	2,740	100 KW.	£339,088*	..	482 arc,† 588 cbn., 7 mtl.		

KW.	..	..	..	161 KW.	..	Lg. 3½	Flat rate	..	.. ..	273
KW.	2 arc, 200 inc., 92 Nernst	57=140 H.P.	..	628 KW.	..	Lg. 3½ to 2; pb. lg. 2; pr. 2½ to ⅔	Flat rate & scale ..	..	.. ..	274
KW.	23 arc ..	248 KW. ..	..	645 KW.	..	Lg. 8 & 3, or 6; pr. 2½ to 1 (all less 5%); htg. 1	Max. demand, flat rate & sl. sel. w. dis.	425,935	Data to Mar. 31, 1912	275
KW.	12 clusters, 4 × 40-c.p. mtl.	120=584 H.P.	..	1,027 KW.	187 KW.	Lg. 4 (factories 3); pb. lg. 2½; pr. 1 & ⅔ (⅓ special)	Flat rate, 2-rate mtr. with discounts	585,665	Data to Mar. 31, 1912	276
KW.	576 mtl. ..	117=662 H.P.	40=1,000 H.P.	2,978 KW.	..	Lg. 4½; pb. lg. 3; pr. 2 & 1½; tr. 1½	Flat rate	1,292,650	Lighting & traction. Data to Sept. 30, 1911	277
W.	2 mtl. ..	6=5½ H.P. ..	..	76 KW.	..	Lg. 7 with discounts; pb. lg. 4; pr. 4 & 2	Flat rate with discounts	18,100	Data to Dec. 1908	278
KW.	12 arc, 27 × 50 c.p. mtl.	559=3,041 H.P.	24=564 KW.	4,878 KW.	1,078 KW.	Lg. 6 & 1½, or 3½; pb. lg. 2; pr. 2 to ⅔; htg. ⅓; tr. 1½ to 1	Max. demand, flat rate & sl. scale	2,979,580	Data to March 31, 1912	279
W.	126 mtl. ..	4=18 H.P. ..	..	40 KW.	..	Lg. 6; pb. lg. 6; pr. 6	Flat rate & contract	23,100	Data to Mar. 31, 1912	280
W.	118 mtl. ..	31=186 H.P.	..	534 KW.	24 KW. dec.	Lg. 7 & 4, or 6; pb. lg. £2 13/6 & £2 3/6 p.a.; pr. 4 & 1½, or 2½	Max. demand, flat rate & contract	127,487	Data to Dec. 31, 1911	281
KW.	105 mtl. ..	8=18½ H.P.	..	199 KW.	9 KW.	Lg. 5; pb. lg. inc. £2½ p.a.; pr. 2½	Flat rate, 2-rate mtr. and contract	170,409	Water power only. Data to Mar. 25, 1912	282
W.	87 inc. ..	.. ..	..	77 KW.	..	Lg. 4½, or 1s. per c.p. p.a.; pb. lg. total £180 p.a.	Flat rate and contract	..	Part water power. *T. Smith, Astley, proprietor. ..	283
W. mt)	55 arc, 200 mtl.	38=150 H.P.	..	820 KW. (about)	..	Lg. 5; pb. lg. arc £14½ to £10, inc. £2½ p.a.; pr. 3 to 1½; hg. 2	Max. dem., flat, 2-rate, con. & spcl.	502,000	Data to Mar., 1911	284
KW.	29 arc, 440 mtl., 210 N.	1,556 H.P. ..	40=1,000 H.P.	2,362 KW.	217 KW.	Lg. 4 or 10/- per 32 w. lamp p.a.; pb. lg. 1.25; pr. 1 to 2; htg. 1 ; ‡	Max. dem. cont. & flat rate; sl. sc. for pr.	2,133,151	Ltg. & tr. *Traction. †43 arcs repl. by mtl. ‡Or 6/8 per 32-w. lp. p a. + 1d. p.u. Tr. 1.25. Data to Mar. 31, 1912.	285
W.	15 KW. ..	96 KW. ..	..	247 KW.	5.5%	Lg. 4½ to 6; pr. 1½ upwards, sl. scale	Flat rate & sliding scale	..	Norton supplied from Malton. °C.W. Fairweather (Mgr.). Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	286
KW.	..	14=38.5 H.P.	..	492 KW.	..	Lg. 6, first 2½ units per 8-c.p. per qr., all above, 4; pr. 3	Special scale and flat rate	141,375	Data to Mar. 31, 1910	287
KW.	114 arc ..	5,421=54,980 H.P.	See other Table	69,568 KW. (ex. tr.)	6,740 KW. (ex. tr.)	Lg. 3½ or £7 per KW. + 1½ p.u.; pb. lg. 1½; pr. 1½ to .7; tr. 1 aprx.	Max. dem., fl. rate, sl. scale., t sw. & spl.	93,622,940	Lighting and traction, three stations. *Also 240 and 400 v. A.C.; tr. 500 v. D.C. Data to March 31, 1912	288
W.	40 arc, 24 mtl.	127=446 H.P.	44=1,906 H.P.	2,318 KW.	8.7%	Lg. 7 & 1 or 4; pr. 4 & 1; tr. 1½ to 1; htg. 1	Max. dem., flat, 2-rate, & time switch	1,127,189	Lighting & traction. *Incl. destructor, £13,400. Data to Mar. 31, 1912	289
KW.	2 arc, 60 mtl.	5=10 H.P.	..	163 KW.	..	Lg. 4½; pb. lg. arc £12½, mtl. £3½ p.a.	Flat rate	60,000	Overhead mains. *Private lg. 220 volts 2-wire; public lg. 110 volts 3-wire. Data to April 15, 1910	290
KW.	25 arc, 30 mtl.	72=216 H.P.	120=2,400 H.P.	1,220 KW. (ex. tr.)	162 KW.	Lg. 5 with discount; pb. lg. 2½; pr. 2½ with discount	Flat rate with discounts	1,725,858	Lighting and traction station. Data to Sept. 30, 1911	291
W.	..	111.5 KW., inc. hg.	..	360 KW.	11 KW.	Lg. 7 & 4; pr. 2½	Max. demand & flat rate	66,471	Data for 1911	292
KW.	.. ..	65=190 H.P.	..	695 KW.	35 KW.	Lg. 5½; pr. 4 & 1½, or 2½ ..	Lg. flat & contract; pr. m.d. & flat	251,211	Data to Dec. 31, 1911	293
W.	2 cbn., 44 N.	12=31 H.P.	..	111 KW.	..	Lg. 6; pb. lg. 3; pr. 3; hg. 1½	Flat rate	23,204	*Resident engineer S. Johnston. Gas power. Data to Dec. 31, 1909	294
KW.	1,427 mtl. ..	313 H.P. ..	32=1,060 H.P.	1,974 KW.	167 KW.	Lg. 7 & 2* or 4; pb. lg. £3 & £3 3s. pr. pair; pr. 4½ & 1½; tr. 1½; htg. 1	Max. dem.*, 2-rate mtr. and flat rate	954,128	Lighting and traction. * Max. average, 3¾d. Data to Dec. 31, 1911	295
W.	57 mtl. ..	.. ..	..	26 KW.	..	.. ..	Flat rate and contract	12,100	Data to Mar. 25, 1910	296
W.	22 arc, 221 cbn., 41 mtl.	14=91 H.P.	..	550 KW.	50 KW.	Lg. 3, 3½, 4; pb. lg. 2.06; pr. 1, 1½, 2, 2½, 3	Flat rates	853,737	Data to Mar. 31, 1912	297
KW.	..	1,450 H.P.	..	3,120 KW.	..	Lg. 6 & 2, or 4; pr. 2 & 1	Max. demand & flat rate	1,668,000	Motors on hire-purchase system. Data to Mar. 31, 1909	298
W.	18 arc, 36 cbn.	67=450 H.P.	See other Table	360.5 KW. (ex. tr.)	..	Lg. 4 to 3; pb. lg. 3; pr. 2 to 1 less 5%; tr. 1½ to 1	Flat rate and sliding scale	994,519	Lighting and traction; local Tramway Co. and Manchester Corporation supplied. Data to Mar. 31, 1912	299
	..	.. ..	..	..	..	.. ..	..	..	Suction gas plant	300
KW.	5 arc, 126 mtl.	22=100 H.P.	..	390 KW.	80 KW.	Lg. 5; pb. lg. 3; pr. 2 & 1 ..	Flat rate, contract & special	159,156	Gas power. Supply has been extended to Dunster. Data to Dec. 31, 1911	301
	56 mtl. ..	15=68 H.P.*	..	220 KW.	..	Lg. 6; pb. lg. 1; pr. 2 & 1 ..	Flat rate, & sliding scale with dis.	47,714	*Fans and radiators, 15 H.P. Bulk supply from Yorkshire Electric Power Co. Data to Mar. 31, 1912	302
W.	7 cbn., 290 mtl.	14=46.5 H.P.	..	204 KW.	..	Lg. 5½; pb. lg. £512 p.a.; pr. 3; tr. 2; sewage pumping £260	Flat rate .. .	153,886	Water power. Data to Mar. 31, 1912	303
KW.	20 H.C.P. lns., 12 cbn., 315 mtl.	75=253 H.P.	..	788 KW.	56.4 KW.	Lg. 6 & 4, or 5½; pb. lg. £830 p.a.; pr. 4 (peak) & 1½, or 2½	Max. dem., flat, 2-rate meter, & contract	222,104	Data to Dec. 31, 1911	304
...	104 arc, 275 inc., 3 N.	22=99 H.P. ..	..	633 KW.	..	Lg. 5 & 6; pb. lg. arc 1s. 3d. per night, inc. 4½d. p. u.; pr. 3	Flat rate	204,145	.. ..	305
W.	15 arc, 71 mtl.	45=115 H.P.	*	524 KW.	..	Lg. 6 w. dis. to 25%; pb. lg. arc £22 p.a.; pr. 2½ to ⅝ less 2½%	Flat rate with discounts	156,929	Output again decreased owing to use of mtl. lamps. *Two motor-generator-, 250 KW. each. Data to Mar. 31, 1912	306
W.	..	71 KW. (inc. pr. & hg.)	..	223 KW.	..	Lg. 4½ to 5½; pr. 2½ to 1½ ..	Flat rate & sliding scale	..	°C. W. Fairweather (Mgr.) Cons. engs., Merz & McLellan. Data to Dec. 31, 1911	307
KW.	60 arc, 597 inc., 62 Nernst	163=1,438 H.P.	..	2,033 KW.	..	Lg. 3½; pb. lg. arc £15, inc. £9½ & £2, N. £3½ p.a.; pr. 2 to ⅔	Flat rate and sliding scale	..	.. ..	308
W.	20 arc ..	18=86 H.P.	32=800 H.P.	879 KW. (ex. tr.)	3.8%	Lg. 6 & 1½, or 4; pb. lg. 2½; pr. 3 & 1½; tr. 1½	Max. demand, flat rate & contract	673,514	Lighting and traction. Lighting output reduced by use of metallic filament lamps. Data to Dec 31, 1911	309
	..	395 H.P. ..	22=570 H.P.	..	..	Lg. 4 to 3; pr. 2½ to 1½ less 5%; tr. 2	Sliding scale ..	819,261	Lighting and traction. Data to Mar. 31, 1912	310
W.	..	50=233 H.P.	..	778 KW.	128 KW.	Lg. 7 & 3, or 6; pr. 4 & 1 ..	Max. demand, flat rate & contract	239,111	Gas and water power. Data estd. to Dec. 31, 1911 ..	311
	54 mtl. ..	..	..	..	..	Lg. 6; pb. lg. contract; pr. 2 ..	Flat rate & contract	..	Water power. Supply commenced Sept. 20, 1909. Data to April 30, 1912	312
	..	.. ..	..	21,706 KW.	..	Lg. 3½ net; pr. 1½ max... ..	Flat, sl. sc., 2-r. mtr. con. w. dis. & t.sw.	13,122,792	Large power load. Data to Dec. 31, 1911	313
W.	437 arc ..	17=140 H.P.	430=12,930 H.P.	..	..	Lg. 2 to 2½; pr. 1½ & special rates	Flat rate & sliding scale	117,168	*Lighting and traction. Light and power supplied to public buildings only. Data to Mar. 31, 1912	314
KW.	88 KW. ..	31,552 KW.	Tr. 12,170 KW. Blk. 61,540 KW.	113,114 KW.	8,888 KW.	Lg. 3½ less 5%; pb. lg. inc. £2/15/6 p.a.; pr. 1½ w. dis.	Flat rate w. dis., time sw., cont. & special	..	Lg. & tr. Cons. engs., Merz & McLellan (see other table Power Cos.). *Tr. 500 & 600 v. Data to Dec. 31, 1911	315
W.	..	4=9 H.P. ..	..	167 KW.	..	Lg. 6; pr. 3	Flat rate & special	61,500	Gas power; town gas at 1s. 9d. per 1,000 cubic ft. ..	316
W.	12 arc ..	15=87 H.P.	..	785 KW.	..	Lg. 7 & 4, or 6; pb. lg. arc £8½ p. a.; pr. 4 & 1½	Max. demand and flat rate	158,349	Data to Dec. 31, 1908	317
KW.	30 arc, 62 cbn., 5 N.	62=200 KW.	..	1,418 KW.	8%	Lg. 6, or cont. + 1½; pr. 4 & 1½, or 2½	Max. demand and flat rate	485,159	Supply from N. to C. at 2,500 volts D.C. Data to Dec., 1911	318
KW.	168 arc, 300 mtl., 96 N.	344=3001 H.P.	88=2,040 H.P.	6,590 KW.	..	Lg. 4½ & 3½; pb. lg. arc £16, N. £2½, p. a.; pr. 3 to 1; htg. 1; tr. 1.35	Flat w. dis., sl. sc., 2-rate meter & time sw.	3,615,783	Lighting and traction. *Tr. 500. †Two gen. stns.; energy sold to tramways. Data to Mar. 31, 1912	319
W.	10 cbn., 300 mtl.	1=20 H.P. ..	..	400 KW.	..	Lg. 6; pr. 3	Flat rate & contract	..	.. ..	320
W.	20 arc, 288 mtl.	45=227 H.P.	..	684 KW.	64.7 KW.	Lg. 7 & 3, or 6; pb. lg. contract; pr. 4 & 1½, or 2½	Max. demand, flat rate and contract	286,572	Data to Dec. 31, 1912	321
KW.	32 arc, 84 mtl.	33=90 H.P.	..	235 KW.	1 KW. (dec.)	Lg. 6; pb. lg. arc 13/-, inc. 3/9 & 3/-, per 100 hrs.; pr. 4 to 1½	Flat rate w. dis., sl. scale & contract	85,798	Decrease in total connections due to use of metal lamps. Data to Dec. 31, 1911	322
KW.	..	2,162 H.P. ..	..	3,755 KW.	17.0%	Lg. 6 & 3, or 5 (pr. ho. 4½*); pr. 2 to 1; htg. 1½	Max. demand, flat & sl. scale w. dis.*	2,497,871	*Alternative, 12½% per annum on assessment, and 1½ per unit for energy used for dom. pur. Data to Dec. 31, '11	323
W.	43 mtl. ..	86=547 H.P.	..	1,128 KW.	..	Lg. 6 & 4; pb. lg. 1.66; pr. 1½	Max. demand and flat rate	232,992	A. W. Solater, Cons. eng. Mond gas power. Data to Dec. 31, 1911	324
KW.	20 arc ..	485=2,662 H.P.	..	6,581 KW.	..	Lg. 4½*; pb. lg. 1; pr. 3 to ¾ ..	Flat rate, sliding scale & special*	4,056,869	Purchased from Co. in 1902. *Also 12% on assessment and 1d. p.u. Data to Mar. 31, 1909	325
	80 arc ..	1,349=5,210 H.P.	..	13,600 KW. (ex. tr.)	470 KW.	Lg. 5 & 1½; pb. lg. 5 & 1½; pr. 1½; tr. 1½	Max. demand & flat rate	12,577,336	Lighting and traction. Data to Mar. 31, 1912	326
	20 500 c.p., 134 50 to 75 c.p., mtl.	.. ..	..	1,427 KW.	190 KW.	Lg. 5 to 2; pb. lg. £8½ p.a.; pr. 2½ to ⅔	Flat rate & sliding scale*	677,086	*Alternative tariff based on assessment, with low charge per unit. Data to March 31, 1912	327
W.	33 arc, 126 mtl.	24=156 H.P.	..	442 KW.	13 KW.	Lg. 7; pr. 4 to 1½	Lg. flat rate, pr. sl. scale, with dis.	159,984 (est.)	*On feeders. Data to May 15, 1912..	328
W.	210 inc. ..	.. ..	..	200 KW. ..	..	Lg. 3, 4, 4½; pb. lg. contract ..	Sliding scale & contract	..	Data to April 20, 1909	329
	23 arc, 16 mtl.	..	See other Table	4,930 KW. (ex. tr.)	..	Lg. 4 & 1½; pb. lg. 2½; pr. 2 to 1; tr. 1½ to 1½	Max. demand, flat, sl. scale & 2-rate	5,720,331	Lighting and traction. Data to Mar. 25, 1910	330
W.	..	3=12 H.P. ..	..	215 KW.	33 KW.	Lg. 6½ w. dis.; pr. 3 (minimum 10 - per H.P.)	Max. demand and flat rate	129,179	Data to Dec. 31, 1911	331
W.	32 inc. ..	3=6 H.P. ..	..	96 KW.	..	Lg. 6½; pb. lg. £2½ p.a.; pr. 3..	Flat rate with rebate	20,000	.. ..	332
KW.	32 arc, 48 mtl.	133=213 H.P.	..	3,461 KW.	..	Lg. 6 w. dis.; pb. lg. 2½; pr. 1½ w. dis.	Flat rate, with discounts	1,190,844	Data to Dec. 31, 1910	333
W.	14 arc, 32 mtl.	19=32 H.P.	133 KW.	340 KW.	200 KW.	Lg. 6; pr. 3; tr. 1.8	Flat rate, with discounts for power	93,987	*Lighting and traction. Traction supply commenced Sep. 17, 1911. Data to Dec. 31, 1911	334
KW.	95 arc, 18 mtl.	181=1314½ H.P.	104=2,600 H.P.	6,807 KW.	..	Lg. 4; pb. lg. arc £35 p.a.; pr. 1½ to ½; tr. .975	Flat rate & sliding scale	2,930,775	Lighting and traction. Data to May 15, 1912	335
W.	324 arc, 758 cbn., 220 mtl.	379=3,944 H.P.	..	4,823 KW.	1,346 KW.	Lg. 3, or 6 & 1; pb. lg. arc £17½, inc. £3 p.a.; pr. 1	Flat rate, sl. scale, & max. demand	2,448,924 (approx.)	Data estimated to May 15, 1912	336
W.	12 arc, 34 cbn., 206 mtl., 80 N.	17=149 H.P.	(see Wigan).	249 KW.	..	Lg. 5, 4, 3; pb. lg. 3; pr. 2 to 1; tr. 1½	Flat rate with disc., & time sw.	754,980	Lighting and traction. Data to Mar. 31, 1910	337
	43 arc, 983 mtl.	.. ..	..	1,493 KW.	170 KW.	Lg. 4½; pb. lg. arc £20, inc. £4 p.a.; pr. 4½ & 1½; htg. 1½	Flat rate, 2-rate mtr. w. time sw., & cont.	657,410	Data to Mar. 31, 1912	338
W.	110 mtl. ..	10=120 H.P.	..	776 KW.	..	Lg. 7 & 2, or 4½; pb. lg. 54s. per 50 c.p. lp. p.a.; pr. 4½, 1½ & 1	Max. dem., flat rate, & sl. scale	467,446	Data to Dec. 31, 1911	339
W.	..	12=28 H.P.	..	110 KW. about	45 KW.	Lg. 5; pr. 2½ to 1½	Flat rate with dis.	84,394	Suction gas plant. Data to Dec. 31, 1911	340
W.	101 arc, 57 mtl.	114=450 H.P.	24=840 H.P.	1,914 KW.	..	Lg. 3½ to 2½; pb. lg 1½; pr. 2½ to 1½; tr. 1½	Flat rate	924,195	Lighting and traction. Data to May 15, 1911	341
W.	119 arc, 4 cbn., 144 mtl.	94=338 H.P.	28=560 H.P.	1,466 KW.	3.8%	Lg. 4½ & 4; pb. lg. £13; pr. 1½; tr. 2 to 1½	Flat rate and sl. scale	715,408	Lighting and traction. Data to Mar. 31, 1912	342
W.	80 arc ..	88=309 KW.	86=1,689 KW.	4,240 KW.	..	Lg. 3½ to 2½; pb. lg. arc £21 p.a.; pr. 1½; tr. 1½	Flat rate, w. rebate 12 mt. to 3 p.m.	2,004,154	Lighting and traction. Data for 1906-7	343
W. (x)	6 arc ..	13=64 B.H.P.	..	200 KW. (approx)	..	Lg. 6; pb. lg. 3; pr. 3 & 2 ..	Flat rate	94,648	Data to Dec. 31, 1909	344
W.	39 arc ..	31=120 H.P.	52=1,934 H.P.	2,210 KW.	..	Lg. 7 & 1, or 3½ (se.); pb. lg. 1½; pr. 1½ & 1; tr. 1½	Max. demand and sliding scale	1,072,906	Lighting and traction. Data to Mar. 31, 1909	345
W.	22 mtl. ..	1=5 H.P.	1=1 H.P.	25 KW.	..	Lg. 6; pb. lg. 35/- per 30 w. lp.; pr. 4	Flat rate & contract	..	Data to May 21, 1912	346
	..	.. ..	..	..	..	.. ..	..	..	.. ..	347
	432 arc, † 588 cbn., 7 mtl.	388=1,598 H.P.	..	..	..	Lg. 4 to 2½; pb. lg. arc £16 (flame £10, inc. £3 p.a.; pr. 1½	Flat rate & sliding	3,472,340	*To March 31, 1911. †272 large arcs, 16 [illegible]	

336	PARTICK	Partick Corporation	1902	W. Sillery ..	240 & 480	Direct ..	2,450	1,800	150 KW.	£144,500 (approx.)	1,601 KW.	834 arc, 753 cbn., 220 mtl.	379=3
337	PEMBERTON	Wigan Corporation	1902	James Slevin ..	230 & 460 tr. 550	Direct ..	900	127 lg. 982 tr.	75 KW.	£48,649	120 KW.	12 arc, 84 cbn., 206 mtl., 80 N.	17=1
338	PEMBROKE (DUBLIN) ..	Pembroke Urban District Council	1900	S. L. R. Price ..	220 & 440	Direct ..	600	889	192 KW. for 2½ hrs.	£74,000	..	43 arc, 288 mtl.	
339	PENARTH	Penarth Electric Lighting Co., Ltd.	1901	H Cameron ..	230, 460 & 500	Direct ..	530	380	40 KW.	..	771 KW.	110 mtl. ..	10=1
340	PENRITH	Penrith Electric Supply Co., Ltd.	1909	Dundas Fox ..	110 & 220	Direct ..	100	55	55 KW.	£6,500	60 KW.	..	12=1
341	PERTH	Perth Corporation	1901	J. Lambert ..	230 & 460	Direct ..	1,175	700	276 KW.	£80,014	916 KW.	101 arc, 57 mtl.	114=4
342	PETERBOROUCH ..	Peterborough Corporation ..	1900	J. C. Gill ..	200 & 400	Direct ..	840	522	72 KW. lg. 72 KW. tr.	£58,402	801 KW.	119 arc, 4 cbn., 144 mtl.	94=3
343	PLYMOUTH	Plymouth Corporation ..	1899	E. G. Okell ..	100 & 200 tr. 500 D.C.	50~, 1-ph. D.C. for tr.	2,800	1,480	287 KW. for 5 hrs.	£155,340	2,250 KW.	80 arc ..	88=3
344	PONTYPOOL	Pontypool Electric Light & Power Co., Ltd.	1893	G. Elwell ..	103	Direct ..	169	188	21 KW.	£11,412	125 KW. (approx)	6 arc ..	12=64
345	PONTYPRIDD	Pontypridd Urban District Council	1905	J. E. Teasdel ..	230 & 460 tr. 500	Direct ..	900	788	495 KW.	£68,527	618 KW.	39 arc ..	31=1
346	PORLOCK	Porlock & District Electric Supply Co.	1912	W. J. Smither ..	200	Direct ..	21	12	7 KW.	£2,500	19.8 KW.	22 mtl. ..	1=5
347	PORTPATRICK ..	Portpatrick Electric Supply Co., Ltd.	1904	..	200 & 400	Direct ..	50	..	..	..	..	..	
348	PORTSMOUTH	Portsmouth Corporation ..	1894	W. S. Foale ..	100	50~, 1-ph.	4,450	2,740	100 KW.	£339,088*	..	432 arc,† 598 cbn., 7 mtl.	388=1,
349	PRESCOT & DISTRICT	British Insulated & Helsby Cables, Ltd.	1891	R. P. Nash ..	100 A.C., 250 & 550 D.C.	100~, 1-ph. & direct	1,760	1,480	..	£71,169	420 KW.	23 arc, 144 cbn., 125 mtl.	175=3,
350	PRESTON	National Electric Supply Co., Ltd.	1892	J. H. Tonge ..	230 A.C., 230 & 440 D.C.	50~, 1-ph., & direct	2,680	1,359	88 KW.	£185,842	3,200 KW.	64 arc ..	319=1, (inc.
351	PUDSEY	Pudsey Corporation	1905	Edward Denton	230, 460 D.C. 230 A.C.	Direct & 50~, 1-ph.	110	50	..	£5,810	124 KW.	20 mtl. ..	20=3
352	QUEENSTOWN	Cork Electric Tramways & Lighting Co., Ltd.	1900	W. H. Joyce ..	230 & 460	Direct ..	230	107	270 A.H.	£26,546	213 KW.	15 arc, 24 cbn.	6=34
353	RADCLIFFE	Radcliffe Urban District Council	1904	H. Wilkinson ..	220 & 440 tr. 525	Direct ..	780	530	88 KW.	£81,393	317 KW.	15 arc, 3 mtl.	60=6
354	RAMSGATE	Ramsgate and District Electric Supply Co., Ltd.	1905	C. E. Hume ..	240 & 480	Direct ..	590	292	150 KW.	£49,589	880 KW.	..	59=2
355	RATHMINES	Rathmines Urban District Council	1900	G. F. Pilditch ..	220 & 440	Direct ..	750	416	400 KW.	£115,232	1,258 KW.	108 arc, 509 mtl.	82=1
356	RAWTARSH	Maxborough & Swinton Tramways Co.	1907	P. Priestly (Res.)	230 & 460 tr. 500	Direct ..	1,000	500	200 & 400 KW.	..	221 KW.	96 mtl. ..	6=19
357	READING	Reading Electric Supply Co., Ltd.	1895	E. Rowley Hill ..	200 & 400 D.C. 200 A.C.	Direct, & 67~, 1-ph.	2,150	1,273	180 KW.	£167,779	3,035 KW.	278 mtl. ..	280=1,
358	REDDITCH	Redditch Urban District Council	1899	W. J. Ferguson ..	210	70~, 1-ph.	744	480	..	£36,739	292.4 KW.	330 inc. ..	145=8
359	REIGATE	Reigate Corporation	1901	W. S. Ross ..	200	50~, 1-ph.	480	249	..	£45,000	710.5 KW.	87 mtl. ..	23=6
360	RHYL	Rhyl Urban District Council	1901	E. H. Wright ..	230	Direct ..	495	221	33 KW.	£26,990	375 KW.	58 arc, 8 inc.	19=2
361	RICHMOND (SURREY) ..	Richmond (Surrey) Electric Light & Power Co., Ltd.	1898	L. C. B. Trimnell	220 & 440	Direct ..	1,150	632	55 KW.	£143,072	2,171 KW.	..	223 htg. 15
362	ROCHDALE	Rochdale Corporation ..	1900	C. C. Atchison ..	220 & 440,* tr. 500	Direct & 50~, 3-ph.*	2,476	1,018 lg. 1,372 tr.	180 A.H.	£109 435	1,800 KW.	..	344=2,
363	ROSS	Ross Electric Light & Power Co., Ltd.	1902	Chas. E. Gray ..	230	Direct ..	100	35.6	50 KW.	£6,900	103 KW.	8 mtl. ..	5=10
364	ROTHERHAM	Rotherham Corporation ..	1901	Edward Cross ..	230, 460 D.C. 230, 400 A.C.*	Direct & 50~, 3-ph.	2,485†	1,318	46 KW.	£70,694	1,143 KW.	..	163=1,
365	ROTHESAY	Rothesay Corporation ..	1899	E. B. Stiven ..	230 & 460	Direct ..	84	24	..	£3,000	..	36 arc, 84 inc.	
366	ROTTINGDEAN	New Rottingdean Electricity Co., Ltd.	1896	J. W. Brown ..	100	Direct ..	48	..	..	..	83 KW.	16 inc. ..	1 H.P.
367	ROUNDHAY	Roundhay & District Electric Lighting Co., Ltd.	1908	H. Fox	230 & 460	Direct ..	160	109	600 A.H.	£15,000	3,255 KW.	30 Nernst ..	10 H.P
368	RUGBY	Rugby Urban District Council	1908	Thos. S. Shenton	220	50~, 3-ph.	210	280	..	£16,980	576 KW.	..	32=96
369	RYDE & ST. HELENS ..	Isle of Wight Elec. Lt. & Pr. Co., & St. Helens El. Lg. Co.	1900	A. E. Mayes (Ast. H. Groome)	240 & 480	Direct, & 50~, 1-ph.	350	198	144 KW.	£63,276	695 KW.	55 mtl. ..	55=10
370	ST. ALBANS	North Metropolitan Electrical Power Distribution Co., Ltd.	1908	T. E. Eachus* (res.)	230 & 460	Direct ..	†	186	..	£17,495	377 KW.	..	65=30
371	ST. ANDREWS ..	Electric Supply Corporation, Ltd.	1905	K. A. Scott-Moncrieff*	225 & 450	Direct ..	300	83.8	80 KW.	£24,340	420 KW.	4 arc, 8 cbn.	50=13
372	ST. ANNES-ON-SEA ..	St. Annes-on-Sea Urban District Council	1901	J. H. Clothier ..	240, tr. 500	Direct ..	750	330 lg. 270 tr.	13 KW.	£58,084	1,444 KW.	10 fl. arcs, 84×5 & 353×1 mtl.	43=87
373	ST. AUSTELL	St. Austell & District Electric Lighting & Power Co., Ltd.	1898	T. Hill	110 & 220	Direct ..	120	62	46 KW.	£8,000	112 KW.	117 Nernst ..	11=90
374	ST. HELENS	St. Helens Corporation ..	1893	E.M.Hoilingsworth	230, 460, 500 D.C.*	Direct & 50~, 3-ph.	4,000	1,890	500 KW.	£183,195	1,894 KW.	169 mtl. ..	334=2,0
375	SALE	Sale Urban District Council ..	1908	C. J. Wood ..	220 & 460	Direct ..	200	92	80 KW.	£16,000	475 KW.	10 arc, 4 cbn., 310 mtl.	16=32
376	SALISBURY	Salisbury Electric Light & Supply Co., Ltd.	1898	A. B. Randall ..	210	Direct ..	600	332	134 KW.	£72,958	1,056 KW.	88 mtl. ..	77=230
377	SALTBURN	Cleveland Trust, Ltd.	1899	C. W. Thompson	220	Direct ..	200	85	92 KW.	£14,000	370 KW.	..	12=60
378	SCARBOROUCH ..	Scarborough Electric Supply Co., Ltd.	1898	F. G. Holden ..	200 A.C. 500 D.C.	60~, 1-ph., & direct	1,945	834	175 KW	£118,192	1,980 KW.	..	453 H.P
379	SHANKLIN & SANDOWN	Isle of Wight Electric Light & Power Co., Ltd.	1901	A. E. Mayes ..	240 & 480	Direct ..	425	210	40 KW.	£56,740	601 KW. ..	15 arc, 26 cbn., 374 mtl.	40=40
380	SHEERNESS AND QUEENBOROUCH	Sheerness & District Elec. Power & Traction Co., Ltd.	1908	G. L. Kirk ..	230, 440 A.C. 230, 460 D.C.*	Direct, & 50~, 3-ph.	1,000	489	..	£50,493	832 KW.	4 flame arc, 80 mtl.	600 H.P
381	SHEFFIELD	Sheffield Corporation	1894	S. E. Fedden ..	200 & 250 A.C.	50~, 1,2, & 3-ph.	17,400 (two stns.)	11,603	..	£1,063,750 (approx.)	8,328 KW.	65 arc ..	1,914= H.
382	SHILSON	Northern Counties Electricity Supply Co., Ltd.	1905	T. Heron (Res.)*	230 & 460	Direct ..	120	142	..	..	226 KW.	42 KW. ..	53 KW.
383	SHIPLEY	Shipley Urban District Council	1901	S. D. Schofield .	220 & 420 tr. 500	Direct ..	1,170	822	750 A.	£67,209	650 KW.	42 arc, 8 inc.	92=58
384	SHREWSBURY	Shrewsbury Corporation ..	1895	C. M. Johnston	210 & 420	Direct ..	780	283	..	£54,000	600 KW. ..	51 arc, 56 cbn., 539 mtl.	85=19
385	SIDCUP	Foots Cray Electricity Supply Co., Ltd.	1907	A. Wright (Manager)	100	50~, 1-ph.	105*	95	..	£14,000	238 KW. ..	..	..
386	SLEAFORD	Sleaford Urban District Council	1902	W. Henry Wilson	220	Direct ..	180	63	18 KW.	£11,118	116 KW. ..	16 arc, 20 cbn., 120 mtl.	18=41.
387	SLOUCH & DATCHET	Slough and Datchet Electric Supply Co., Ltd.	1906	A. E. Farrow ..	220 & 440	Direct ..	580	250	88 KW.	£44,826	348 KW.	108 mtl. ..	27 ..
388	SMETHWICK AND OLDBURY	Birmingham & Midland Tramways Joint Committee	1904	S. A. Mahood ..	250 & 500, DC.400A C.*	Direct & 25 ~, 3-ph.	6,500	3,708	7.5 KW.	..	490 KW.	..	5,458 K
389	SOUTHAMPTON ..	Southampton Corporation ..	1891	H. F. Street ..	200	Direct ..	2,200	1,470	1,500 KW.	£179,851	1,882 KW.	92 arc, 66 inc., 6 Nernst	40=200
390	SOUTHEND-ON-SEA ..	Southend Corporation ..	1902	Robert Birkett ..	230 & 460, tr. 500	Direct ..	2,050	1,439	80 KW.	£123,000 (approx.)	..	99 arc, 50 cbn., 41 mtl., 117 N.	60=340
391	SOUTHGATE	North Metropolitan Electric Power Supply Co.	1911	H. S. Selves (Res.)*	240 & 415	50~, 3-ph.	300 (trnsf sub-statn.	38	..	£18,092	135.5 KW.	..	7=18.
392	SOUTHPORT	Southport Corporation ..	1894	A. S. Black ..	100 & 210 A.C. 500 D.C.	50~, 1-ph., & direct	2,950	1,577	400 KW.	£300,803	3,543 KW.	75 arc, 150 inc.	93=603
393	SOUTH SHIELDS ..	South Shields Corporation ..	1896	J. H. Cawthra ..	110 & 220 tr. 550 D.C.	50~, 1-ph., & direct	2,700	1,776	517 KW.	£185,000	2,415 KW.	94 arc, 484×2 cbn.	80=2,50
394	SPENNYMOOR	Northern Counties Electricity Supply Co., Ltd.	1908	H. Puttick (Res.) C. W. Fairweather	230 & 460 D.C. 440 A.C.	Direct & A.C.	420*	187	..	..	447 KW.	21 KW. ..	204 KW pr. &
395	STAFFORD	Stafford Corporation	1896	R. B. Meade ..	210 & 420	Direct ..	565	401	110 KW.	£32,500	..	16 arc ..	104=5
396	STALYBRIDGE	Stalybridge, Hyde, Mossley, & Dukinfield Tr. & El. Bd.	1904	Robert Blackmore	230 D.C., 400 A.C., tr. 500	40~, 3-ph., & direct	7,500	6,000	..	£350,000	500 KW. ..	..	260=6,0
397	STAMFORD	Urban Electric Supply Co., Ltd.	1902	F. H. Brandreth	240 & 480	Direct ..	280	205	600 A.H.	£50,052	631 KW. ..	..	85 ..
398	STIRLING	Stirling Corporation	1900	J. W. Papworth	230 & 460	Direct ..	688	273	30 KW.	£43,113	631 KW.	60 arc, 46 cbn., 214 mtl.	84=271
399	STOCKPORT	Stockport Corporation ..	1898	R. Lomax ..	220 & 460 tr. 500	Direct ..	2,050	1,440	200 KW.	£51,000	892 KW.	49 arc, 2 inc., 1 Nernst	78=492
400	STOCKTON-ON-TEES ..	Stockton-on-Tees Corporation	1900	J. J. Smith ..	230 & 460	Direct ..	1,450	625	75 KW.	£57,800 (approx.)	789.7 KW.	Arc 25.3 KW. 44 600-c.p. mtl.	142=8
401	STOKE-ON-TRENT & FENTON	Stoke-on-Trent Corporation ..	1894	C. H. Yeaman ..	240 & 480	Direct ..	800	728	50 KW.	£38,858	640 KW. ..	..	1,000 K
402	STOWMARKET	Suffolk Electricity Supply Co., Ltd.	1896	Napier Prentice	100	Direct ..	78	42	50 KW.	..	100 KW. ..	..	25=40
403	STRATFORD-ON-AVON	Stratford-on-Avon Electricity Co., Ltd.	1907	Cecil D. Falcke	220 & 440	Direct ..	155	120	61 KW.	£13,226	250 KW.	..	22=144 Htg. 18
404	STRETFORD	Stretford Urban District Council	1905	R. Rowland ..	220 & 440, tr. 500	Direct ..	1,500	1,548	200 KW.	£84,500	750.7 KW.	99 arc, 133 mtl.	59=403
405	SUNDERLAND	Sunderland Corporation ..	1895	A. S. Blackman	230 D.C.* 230 & 240 A.C.	Direct, & 50~, 3-ph.	9,500	5,740	451 KW.	£435,499	3,319 KW.	215 arc, 463 mtl.	384=1 KW
406	SURBITON	Surbiton Urban District Council*	1903	T. M. Colson ..	240 & 480	Direct ..	380	215	90 KW.	£59,046	999 KW.	2 Nernst ..	22=495
407	SUTTON, DARLTON, WALLINGTN & CHEAM	South Metropolitan Electric Tramways & Lighting Co.	1902	A. V. Mason ..	200 A.C., tr. 500 D.C.	50~, 1-ph., & direct	1,500	877	..	£80,538	964 KW.	2 arc, 476 mtl., 2 Nernst	33=148
408	SUTTON COLDFIELD ..	Sutton Coldfield Corporation	1901	T. Duesbury ..	230 & 460	Direct ..	625	295	90 KW.	£47,149	997 KW.	230 poste, 1,000 c.p. to 50 c.p.	99=185
409	SWANSEA	Swansea Corporation	1901	C. A. L. Prussmann	220 & 440 tr. 550	Direct and 50~, 1-ph.	2,325	1,867	78 KW.	£152,560	2,274 KW.	74 arc, 80 mtl.	1,748 H.
410	SWINDON	Swindon Corporation	1903	A. Dimmock ..	220 & 440 tr. 550	Direct ..	900	689	44 KW.	£37,881	975 KW.	21 arc, 341 mtl.	332 H.P
411	SWINTON & PENDLEBURY	Swinton & Pendlebury Urban District Council	1907	E. C. Bostock (Res.)*	230 & 500	Direct ..	150	93	..	£11,400	746 KW.	2 arc, 24 mtl.	37=243
412	TAUNTON	Taunton Corporation	1899*	E. B. Thornhill	105 & 210 tr. 560 D.C.	50~, 1-ph., & direct	1,100	570	..	£70,111	980 KW.	73 arc, 44 cbn., 230 mtl.	104=52

594 arc, 750 cbn., 220 mtl.	379=8,944 H.P.	..	4,833 KW.	1,246 KW.	Lg. 4; pb. lg. arc £35 p.a.; pr. 1½ to ½; tr. .975	Flat rate & sliding scale	2,220,775	Lighting and traction. Data to May 15, 1912	335
12 arc, 34 cbn., 206 mtl., 80 N.	17=149 H.P.	(see Wigan).	249 KW.	..	Lg. 3, or 6 & ½; pb. lg. arc £17½, inc. £3 p.a.; pr. 1	Flat rate, sl. scale, & max. demand	2,448,924 (approx.)	Data estimated to May 15, 1912	336
48 arc, 288 mtl.	..	..	1,433 KW.	170 KW.	Lg. 4½; pb. lg. arc £20, inc. £4 p.a.; pr. 4½ & 1½; htg. 1½	Flat rate with disc., & time sw.	754,969	Lighting and traction. Data to Mar. 31, 1910	337
110 mtl. ..	10=120 H.P.	..	776 KW.	..	Lg. 7 & 2, or 4½; pb. lg. 54s. per 50 c.p. lp. p.a.; pr. 4½, 1½ & 1	Flat rate, 2-rate mtr. w. time sw., & cont.	657,410	Data to Mar. 31, 1912	338
..	12=28 H.P.	..	110 KW. about	45 KW.	Lg. 5; pr. 2½ to 1½	Max. dem., flat rate, & sl. scale	467,446	Data to Dec. 31, 1911	339
101 arc, 57 mtl.	114=450 H.P.	24=840 H.P.	1,914 KW.	..	Lg. 3½ to 2½; pb. lg 1½; pr. 2½ to 1½; tr. 1½	Flat rate with dis.	84,934	Suction gas plant. Data to Dec. 31, 1911	340
119 arc, 4 cbn., 144 mtl.	94=335 H.P.	28=560 H.P.	1,466 KW.	3.6%	Lg. 4½ & 4; pb. lg. £12; pr. 1½; tr. 2 to 1½	Flat rate	924,195	Lighting and traction. Data to May 15, 1911	341
60 arc ..	88=309 KW.	86=1,689 KW.	4,240 KW.	..	Lg. 3½ to 2½; pb. lg. arc £21 p.a.; pr. 1½; tr. 1½	Flat rate and sl. scale	715,408	Lighting and traction. Data to Mar. 31, 1912 ..	342
6 arc ..	12=64 B.H.P.	..	200 KW. (approx)	..	Lg. 6; pb. lg. 3; pr. 3 & 2 ..	Flat rate, w. rebate 12 mt. to 3 p.m. Flat rate	2,004,154	Lighting and traction. Data for 1906-7	343
39 arc ..	31=120 H.P.	52=1,924 H.P.	2,210 KW.	..	Lg. 7 & 1, or 3½ (sc.); pb. lg. 1½; pr. 1½ & 1; tr. 1½	Max. demand and sliding scale	94,643	Data to Dec. 31, 1909	344
22 mtl. ..	1=5 H.P.	1=1 H.P.	25 KW.	..	Lg. 6; pb. lg. 35/- per 80 w. lp.; pr. 4	Flat rate & contract	1,072,206	Lighting and traction. Data to Mar. 31, 1909	345
..	..	..	..	..	.. ..	..	..	Data to May 21, 1912	346
..	..	..	..	..	.. ..	..	..	.. ..	347
482 arc,† 588 cbn., 7 mtl.	383=1,598 H.P.	..	..	..	Lg. 4 to 2½; pb. lg. arc £16 (flame £10), inc. £3; pr. 1½	Flat rate & sliding scale	3,472,340	*To March 31, 1911. †272 large arcs, 160 flame arc. Data to Mar. 31, 1912	348
23 arc, 144 cbn., 125 mtl.	175=3,051 H.P.	8=200 H.P.	3,889 KW.	..	Lg 4; pb. lg. 2; pr. 1; tr. 1½	Flat rate with dis. & contract	3,392,695	Lighting and traction. Supply to Prescot Dist., S. Lanc. Trys. and B.I. & H.C. works. Data to Dec. 31, 1909	349
64 arc ..	319=1,401 KW. (inc. hg.)	..	4,649 KW.	..	Lg. 7 to 4½, less 15%; pb. lg. 1; pr. 1½ to 1 net	Max. demand & sliding scale	1,731,000	Data to Dec. 31, 1908	350
20 mtl. ..	20=87½ H.P.	..	152 KW.	32 KW.	Lg. 4; pb. lg. 3; pr. 2	Flat rate	51,054	Large consumers supplied by the Yorkshire Electric Power Co. Data to March 31, 1912	351
15 arc, 24 cbn.	6=34½ H.P.	..	248 KW. ..	..	Lg. 6, 5 & 4½; pb. lg. arc £15, inc. £3 8s. p.a., ½ night; pr. 8 & 2½	Flat rate	126,720	Data to Dec. 31, 1909	352
15 arc, 8 mtl.	60=697 H.P.	See other Table	890 KW.	..	Lg. 4 to 3; pb. lg. 2; pr. 2 to 0.9; tr. 1½	Sliding scale ..	1,044,593	Lighting and traction. Data to Mar. 31, 1910	353
..	59=260 KW.	..	1,140 KW.	95 KW.	Lg. 7 & 3, or 6; pr. 4 & 1½ ..	Max. dem., flat, 2-r. mtr. & cont. w. dis.	929,549	Data to Dec. 31, 1911	354
108 arc, 509 mtl.	32=115 H.P.	..	1,344 KW.	185 KW.	Lg. 4½ (shops & ch. 4); pb. lg. arc £16, inc. £4½ p.a.; pr. 1½	Flat rate	722,633	Data to Mar. 31, 1912	355
96 mtl. ..	6=19½ H.P.	40=1,400 H.P.	1,366 KW.	..	Lg. 4½; pr. 2; pb. lg. 1½; tr. 1½	Flat rate w. dis., cont. w. t. sw.	776,996	Lighting and traction station. Data to April 30, 1910.	356
278 mtl. ..	280=1,878 H.P.	..	4,432 KW.	411 KW.	Lg. 6 to 2½ (shops 4½ to 3); pr. 1½ to ½	Sliding scale ..	1,515,770	Data to Dec. 31, 1911	357
390 inc. ..	145=878 H.P.	..	1,488 KW.	7.5%	Lg. 4½ & 4, or 4½ & 2; pb. lg. inc. £3 p.a.; pr. 2-1½, 1½ & 1; htg. 1½	Flat rate, cont., 2-rate, sl. sc. for pr.	..	Part gas power. Data to Mar. 31, 1912	358
87 mtl. ..	25=66½ H.P.	..	760 KW.	..	Lg. 7½ & 4½, or 6; pb. lg. inc. £3 p.a.; pr. 2	Max. demand & flat rate	268,414	.. ..	359
56 arc, 8 inc.	19=20 H.P.	..	430 KW.	..	Lg. 6 & 3, or 5; pb. lg. 4; pr. 4 & 2	Max. demand & flat rate	..	.. ..	360
..	223 KW. htg. 191 KW.	..	2,585 KW.	15 KW. dec.	Lg. 5½; pr. 2½; htg. 1½	Flat rate with discoun ts	802,691	Data to Dec. 31, 1911	361
..	344=2,312 H.P.	140=5,100 H.P.	6,255 KW.	..	Lg. 6 & 2, or 4 with dis.; pr. 2 to 6; tr. 1	Max. dem., fl. r., sl. sc., con. w. dis., & sp.	4,168,453	Lighting and traction. *Also 3-phase 50~ at 3,000 volts. Data to Mar. 31, 1912	362
8 mtl. ..	5=10 H.P. ..	..	110 KW.	..	Lg. 7; pb. lg. 3½; pr. 3	Flat rate	23,710	Data to Dec. 31, 1909	363
..	163=1,218 H.P.	74=1,470 H.P.	3,881 KW.	641 KW.	Lg. 4 with dis.; pr. 1½ to 6; tr. 1½	Max. dem., flat rate w. dis., & sl. scale ..	2,903,653	Lg. & tr. *Tr. 520 v. †Available for both lg. & tr. Discounts to large pr. cons. up to 40%. Data to Mar. 31, '12	364
36 arc, 34 inc.	..	..	..	..	.. ..	..	..	.. ..	365
16 inc. ..	1 H.P. ..	..	35 KW. ..	..	Lg. 7	Flat rate	..	.. ..	366
30 Nernst ..	10 H.P. ..	..	354 KW. ..	..	Lg. 6; pb. lg. 4; pr. 2	Flat rate	43,376	Gas power. Data to April 22, 1910	367
..	82=884 H.P.	..	645 KW.	125 KW.	Lg. 4½ less 5%; pr. 2 & 1½ ..	Flat rate with discounts	218,529	Supply from the B.T.-H. Co.'s works at 2,200 volts. Data to Mar. 31, 1912	368
55 mtl. ..	55=100 H.P.	..	861 KW. ..	12	Lg. 6, or contract + 1½; pr. 4 & 1½ or 2½	Max. demand & flat rate	202,024	Gas power. Data to Dec., 1911	369
..	65=303 KW.	..	680 KW.	83 KW.	Lg. 7 & 2½, or 5; pr. 4, 3, 2, or 2½	Max. demand, flat rate & cont.	239,796	*E. T. R. Murray, eng.-in-chief. †Bulk supply from N.M.E.P.S. Co. Data to Dec. 31, 1911	370
4 arc, 8 cbn.	50=138⅔ H.P.	..	555 KW...	..	Lg. 5; pb. lg. 3 to 1½; pr. 3; htg. 1½	Flat rate	121,478	*Resident eng. H. Dixon. Data to Dec. 31, 1909.. ..	371
10 fl. arcs, 34 × 5 & 852 × 1 mtl.	43=87 H.P.	80=2,000 H.P.*	3,116 KW.	126 KW.	Lg. 6 & 2, or 4½; pb. lg. & pr. 2½ to 1½; tr. 1½ to 1½	Max. demand & flat rate with dis.	870,692	Lighting & traction. *Energy sold to Tramway Co., 200 KW. max. demand. Data to Mar. 31, 1912	372
117 Nernst ..	11=90 H.P.	..	151 KW.	..	Lg. 5; pb. lg. contract; pr. 2 ..	Flat rate & contract	90,000	Suction gas plant substituted for steam, 1904. Data to June 1, 1909	373
169 mtl. ..	334=2,930 H.P.	See other Table	4,846 KW.	500 KW.	Lg. 4½ & 3½; pb. lg. 1; pr. 2 & 1 w. dis.; tr. 1.11 & 0.87	Lg. flat r., pr. system of dis., tr. scale	4,816,983	Lighting and traction. *230, 400 A.C. Tr. 500 v. D.C. Data to Mar. 31, 1912	374
10 arc, 4 cbn., 310 mtl.	16=32 H.P.	..	515 KW.	46 KW.	Lg. 5½ & 3, or 5; pb. lg. 2; pr. 3 & 1½, or 2 with lg.	Max. demand & flat rate	103,000	No meter rents charged. Data to Mar. 31, 1912 ..	375
33 mtl. ..	77=230 B.H.P.	..	1,306 KW.	58 KW.	Lg. 7, 4 & 2; pr. 4 & 1, or 2½ ..	Max. demand, and flat rate for pr.	565,952	Part water power. Data to Dec. 31, 1911	376
..	12=60 H.P. ..	..	415 KW.	18 KW.	Lg. 6 to 4; pr. 2½ to 1½ ..	Sliding scale w. dis.	88,323	Diesel Plant. Data to Sept. 30, 1911	377
..	452 H.P. ..	44=1,540 H.P.	3,806 KW.	95 KW.	Lg. 6 to 3; pr. 2; htg. 1; tr. 1.3	Sliding scale with discounts	859,852	Lighting and traction. Data to Dec. 31, 1911	378
15 arc, 26 cbn., 374 mtl.	40=40 H.P.	..	785 KW.	7	Lg. 6, or contract + 1½; pr. 4 & 1½, or 2½	Max. demand & flat rate	202,931	Data to Dec. 1911	379
4 flame arc, 80 mtl.	600 H.P. ..	300 H.P. ..	1,000 KW.	852 KW.	Lg. 4½ & 2½; pr. 2 & 1	Max. demand, flat rate & special	463,264	Lighting and traction *Tr. 500 v. D.C. Data to Dec. 31, 1911	380
65 arc ..	1,914=30,029 H.P.	..	30,088 KW.	3,351 KW.	Lg. 4 w. dis.; pb. lg. various rates; pr. 2 to 0.6; htg. 1	Flat rate with dis., & sl. scale for pr.	17,000,000 (approx.)	Two A.C. stns.: Neepsend 13,500 KW. turbines; Sheaf St. 3,900 KW. various types. Data to Mar. 25, 1912	381
49 KW. ..	33 KW. ..	..	323 KW.	..	Lg. 5; pr. 3 to 1½	Flat rate & sliding scale	..	*C.W. Fairweather (Mgr.). Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	382
42 arc, 8 inc.	92=580 H.P.	948* KW.	1,259 KW.	176 KW	Lg. 4½ & 2; pb. lg. 1½; pr. 2 & 1, or 1½; tr. 1½	Flat rate	1,321,369	Lighting and traction. *Tramway max. demand. Data to Mar. 31, 1912	383
51 arc, 56 cbn., 529 mtl.	85=198 H.P.	..	990 KW.	..	Lg. 6, 4 & 2, or 5; pb. lg. about 2½*; pr. 3, 2 & 1½ w. dis. to 10%	Lg. max. dem. & flat; pr. sl. scale w. dis.	531,527	*Pb. lg. are £20 p.a., inc. £1 14s., £1, £1 and £5 p.a Data to March 31, 1910	384
..	..	..	..	..	Lg. 6; pr. 4	Flat rate	70,000	*Bulk supply	385
16 arc, 20 cbn., 120 mtl.	13=41.5 H.P.	..	160 KW.	..	Lg. 5; pb. lg. arc £12½, glow £2 p.a.; pr. 3	Flat rate	73,238	Data to Mar. 31, 1912	386
103 mtl. ..	27	..	447 KW.	..	Lg. 4, 4½, 6; pb. lg. 3; pr. 3 ..	Flat rate with discount	250,248	Bulk supply to Windsor E. I. Co. at 3.94d. per unit. Data to Mar. 1908	387
..	5,458 KW. ..	850 KW. ..	6,799 KW.	999 KW.	Lg. 7 & 2½ or 4½; pr. 1½ & 1; tr. 1	Max. dem., flat rate, cont. w. dis	7,401,511	Lighting & traction. *Tr. 500 & 550. Data to Dec. 31, 1911	388
92 arc, 66 inc., 6 Nernst	40=200 H.P.	50=1,250 H.P.	2,963 KW.	..	Lg. 4½; pb. lg. 2½; pr. 3 & 2; tr. 2½	Flat rate	..	Lighting and traction	389
99 arc, 50 cbn., 41 mtl., 117 N.	60=340 H.P.	See other Table	3,193 KW. (ex. tr.)	..	Lg. 6 & 3, or 4½* ; pb. lg. arc £13 14s. N. £2 7s. 4d.; pr. 1 & 6 or 2; tr. 1.7	Max. demand, flat, 2 rate & Hopkinson	1,793,000 (estd.)	Lighting and traction. *Also £6 10s. per KW., and 1½d. p.u. Data to Mar. 31, 1909	390
..	7=18.9 KW.	..	154.4 KW.	..	Lg. 7 & 2, or 5; pr. 4, or 3 & 1	Max. demand & flat rate	25,968	*Eng.-in-Chief, E. T. R. Murray. Data to Dec. 31, 1911	391
75 arc, 150 inc.	90=900 H.P.	40=1,620 H.P.	5,252 KW.	..	Lg. 6, 4, & 2, or 4½; pb. lg. arc £20 p.a.; pr. 2 & 1½; tr. 1½ to 1½	Max. demand & flat rate	2,174,722	Lighting and traction. Data to Mar., 1909	392
94 arc, 484 × 2 cbn.	80=2,500 H.P.	70=2,100 H.P.	5,498 KW.	..	Lg. 7 & 1½, or 4; pb. lg. arc £22½*; pr. 1½ to 1; htg. 2; tr. 1.5 to 1.3	Max. dem, flat, & sl. scale w. dis.	3,200,000	Lighting & traction. *Also pb. lg. two 16-C.P. inc., £3 12s. per annum. Data to Feb. 1910	393
21 KW. ..	204 KW. (inc. pr. & hg.)	..	672 KW.	..	Lg. 4; pr. 2½ to 1½	..	..	*Used as stand-by; bulk from Cd. & Dm. E. P. S. Co. Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	394
16 arc ..	104=590 H.P.	..	940 KW.	..	Lg. 4 to 5; pr. 2½ to 1	Flat rate w. dis. ..	587,094	Data to March 31, 1911	395
..	360=6,000 H.P.	120=3,000 H.P.	8,000 KW.	..	Lg. 3½, less ½, or 4 & 2; pr. 2½ to ½; tr. ⅔	Flat, sl. sc., cont. w. dis., & 2-rate	15,000,000	Lighting & traction. Data to May 1, 1912	396
..	85	..	1,069 KW.	..	Lg. 7 & 3, or 5, cont.; pr. 4 & 1, or 2½ or cont., & special	Max. dem., flat, 2-rate, con., t. sw., & sp.	243,942	Wiring and motors on hire purchase 3, 5, or 7 years. Data to Dec. 31, 1911	397
60 arc, 46 cbn., 214 mtl.	94=273 H.P.	..	..	..	Lg. 7 & 2, or 4; pr. 4 to 1; htg. 1½	Max. dem., flat & 2-rate; pr. sl. sc.	877,308	Data to May 15, 1911	398
49 arc, 2 inc., 1 Nernst	73=428 H.P.	90=3,150 H.P.	4,472 KW.	..	Lg. 4; pb. lg. arc £11½ p.a.; pr. 1½ *; tr. 1½	Flat rate	1,319,000	Lighting & traction. *Special rates to large consumers	399
Arc 25.3 KW. 44 600-c.p. mtl.	142=880 KW.	..	1,675 KW.	160 KW.	Lg. 6 & 2, or 4; pb. lg. 2.83; pr. 2 to 1	Max. demand, flat & 2-rate (t.s.) w. dis.	1,030,398	Data to Mar. 31, 1912	400
..	1,000 KW. ..	..	1,640 KW.	..	Lg. 7 & 2 (churches), 4; pr. 1½ to 1	Max. dem, flat, sl. sc. & cont. w. dis.	1,172,174	Data to Mar. 31, 1912	401
..	25=40 H.P.	..	139 KW.	..	Lg. 8 & 6; pr. 6 to 3	Flat rate	..	Gas power	402
..	22=144 H.P. Htg. 15 KW.	..	326 KW.	86 KW.	Lg. 5; pr. 2½, 2, 1½; htg. 1½ ..	Flat rate w. dis. ..	142,406	Data to Dec. 31, 1911	403
99 arc, 132 mtl.	69=403.6 H.P.	See other Table	1,055 KW. (ex. tr.)	..	Lg. 4½, or £7 per KW. p.a. & 1½ p.u.*; pr. 3 to 1†; tr. 1.131	Flat rate, sl. sc. & Hopkinson	2,035,951	Lg. and tr. *Pb. lg. arc £20 (½ nt. £12), inc. £2½, p.a. †Or £1 per B.H.P. per qr. & ¼d. p.u. Data to Mar. 31, 1910	404
215 arc, 463 mtl.	884=12,598 KW.	144=3,704 H.P.	14,544 KW.	752 KW.	Lg. 3.6 to 1½†; pr. 2½ to ⅞, or £3½ per KW. & ½ p.u.; htg. ⅔; tr. 1½	Max. dem., flat & sc.	12,374,591	Lg. & tr., 2 stns. *Tr. 550 v. †Pb. lg. are £14 3. 8. Inc. 100 C.P. £2 9s. Data to Mar. 31, 1912	405
2 Nernst ..	22=45½ H.P.	..	1,082 KW.	..	Lg. 7 & 3, or 6; pb. lg. £3½ per lp. p.a.; pr. 4 & 1½, or 2½	Max. demand and flat rate	254,191	*Worked by Callender's Cable and Construction Co., Ltd. Data to Mar. 31, 1909	406
2 arc, 476 mtl., 2 Nernst	93=148.25 H.P.	250 KW.	1,637 KW.	..	Lg. 5½; pb. lg. are £17½ (½ nt.), inc. & Nernst £3½ p.a.; pr. 2½	Flat rate	482,890	Data to Dec. 31, 1909	407
280 posts, 1,000 c.p. to 50 c.p.	39=185 KW.	..	1,230 KW.	116 KW.	Lg. 5½ to 4; pb. lg. 1.25; pr. 2 & 1½, also contract.	Sliding sc. & cont.	447,512	Data to Mar. 31, 1912	408
74 arc, 60 mtl.	1,748 H.P. ..	..	3,845 KW.	..	Lg. 6 & 2, or 4½; pb. lg. arc £35 & £11 p.a.; pr. 2 & 1½; tr. 1½ to 1	Max. demand and flat rate	2,400,393	Lighting and traction. Arc lighting being extended. Data to Mar., 1909	409
21 arc, 341 mtl.	332 H.P. ..	24=858 H.P.	..	..	Lg. 4, or £5 per KW. & 2 p.u; pb lg. 2.95* av.; pr. 2 w. dis.; tr. 1.'	Max. dem., flat rate and special	849,496	Lighting & traction station. *Including maintenance. Data to Mar. 31, 1910	410
2 arc, 24 mtl.	37=243 H.P.	..	385 KW.	160 KW.	Lg. 4, or ls. per 80-w. lp. & 1½d. p.u.; pb. lg. 2½; pr. 1½ and 1	Flat rate† & sl. sc.	88,083	*Lanes. Elec. Pr. Co. manage undertaking. †Alternative fixed charge per lp. & 1½d. p.u. Data to May 15, 1911	411
72 arc, 44 cbn., 230 mtl.	104=330 H.P.	12=210 H.P.	1,681 KW.	..	Lg. 6 to 3 (outside arcs 2); pr. 2;	Max. demand and	622,582	Lighting and traction. *Purchased from Co. to Data to Mar. 31, 1911	

393	SOUTH SHIELDS	South Shields Corporation ..	1896	J. H. Cawthra ..	110 & 220 tr. 550 D.C.	50~, 1-ph., & direct	2,700	1,776	517 KW.	£185,000	2,415 KW.	94 arc, 484×2 cbn.	280
394	SPENNYMOOR	Northern Counties Electricity Supply Co., Ltd.	1902	H. Puttick (Res.) C. W. Fairweather	230 & 460 D.C. 440 A.C.	Direct & A.C.	400*	187	..	..	447 KW.	21 KW. ..	20
395	STAFFORD	Stafford Corporation	1896	R. E. Meade ..	210 & 420	Direct ..	565	401	110 KW.	£32,500	..	16 arc ..	10
396	STALYBRIDGE	Stalybridge, Hyde, Mossley, & Dukinfield Tr. & El. Bd.	1904	Robert Blackmore	230 D.C., 400 A.C., tr. 500	40~, 3-ph., & direct	7,500	6,000	..	£250,000	500 KW. ..	..	260
397	STANFORD .. .	Urban Electric Supply Co., Ltd.	1902	F. H. Brandreth	240 & 480	Direct ..	380	205	600 A.H.	£50,052	631 KW. ..	..	85
398	STIRLING	Stirling Corporation	1900	J. W. Papworth	230 & 460	Direct ..	638	273	80 KW.	£42,113	631 KW.	60 arc, 46 cbn., 214 mtl.	84
399	STOCKPORT	Stockport Corporation ..	1898	R. Lomax ..	230 & 460 tr. 500	Direct ..	2,050	1,440	200 KW.	£51,000	892 KW.	49 arc, 2 inc., 1 Nernst	73
400	STOCKTON-ON-TEES	Stockton-on-Tees Corporation	1900	J. J. Smith ..	230 & 460	Direct ..	1,450	625	75 KW.	£57,800 (approx.)	789.7 KW.	Arc 25.3 KW. 44 600-c.p. mtl.	142
401	STOKE-ON-TRENT & FENTON	Stoke-on-Trent Corporation..	1894	C. H. Yeaman ..	240 & 480	Direct ..	800	728	50 KW.	£38,858	640 KW. ..	..	1,0
402	STOWMARKET	Suffolk Electricity Supply Co., Ltd.	1896	Napier Prentice	100	Direct ..	78	42	50 KW.	..	100 KW. ..	..	25
403	STRATFORD-ON-AVON	Stratford-on-Avon Electricity Co., Ltd.	1907	Cecil D. Faleke	220 & 440	Direct ..	155	120	61 KW.	£18,226	250 KW.	..	23 Ht
404	STRETFORD	Stretford Urban District Council	1903	R. Rowland ..	220 & 440, tr. 550	Direct ..	1,500	1,548	200 KW.	£84,500	750.7 KW.	99 arc, 133 mtl.	59
405	SUNDERLAND	Sunderland Corporation ..	1895	A. S. Blackman	230 D.C.* 230 & 240 A.C.	Direct, & 50~, 3-ph.	9,593	5,740	431 KW.	£435,499	3,319 KW.	215 arc, 463 mtl.	88
406	SURBITON	Surbiton Urban District Council*	1903	T. M. Colson ..	240 & 480	Direct ..	380	215	90 KW.	£59,046	999 KW.	2 Nernst ..	22
407	SUTTON, CARSHALTON WALLINGTN & CHEAM	South Metropolitan Electric Tramways & Lighting Co.	1902	A. V. Mason ..	200 A.C., tr. 500 D.C.	50~, 1-ph., & direct	1,500	577	..	£30,538	964 KW.	2 arc, 476 mtl., 2 Nernst	33
408	SUTTON COLDFIELD ..	Sutton Coldfield Corporation	1901	T. Duesbury ..	230 & 460	Direct ..	625	285	90 KW.	£47,149	927 KW.	230 posts, 1,000 c.p. to 50 c.p.	39
409	SWANSEA	Swansea Corporation.. ..	1901	C. A. L. Prussmann	220 & 440 tr. 550	Direct and 50~, 1-ph.	2,625	1,967	78 KW.	£153,240	2,374 KW.	74 arc, 60 mtl.	1,7
410	SWINDON	Swindon Corporation.. ..	1903	A. Dimmack ..	220 & 440 tr. 550	Direct ..	900	689	44 KW.	£57,381	975 KW.	21 arc, 341 mtl.	332
411	SWINTON & PENDLEBURY	Swinton & Pendlebury Urban District Council	1907	H. C. Busbridge (Res.)*	250 & 500	Direct ..	150	92	..	£11,400	146 KW.	2 arc, 24 mtl.	87
412	TAUNTON	Taunton Corporation.. ..	1888*	E. B. Thornhill	105 & 210 tr. 550 D.C.	60~, 1-ph., & direct	1,100	570	..	£70,111	930 KW.	72 arc, 44 cbn., 230 mtl.	101
413	THIRSK AND SOWERBY	Northern Counties Electricity Supply Co., Ltd.	1903	J. A. Carr (Res.)*	230 & 460	Direct ..	95	61	..	..	127 KW.	13 KW. ..	8 K
414	TODMORDEN	Todmorden Corporation ..	1905	Henry Talbot ..	230	Direct ..	225	103	13.8 KW.	£20,000	188 KW.	..	31
415	TONBRIDGE	Tonbridge Urban District Council	1902	M. P. Plunkett	220 & 440	Direct ..	270	166	144 KW.	£23,300 (approx.)	288 KW.	18 arc, 114 mtl.	47
416	TONYREFAIL AND CILFACH COCH	Tonyrefail & Gilfach Goch El. Light & Power Co., Ltd.	1904	Arthur J. Arthur	220	50~, 1-ph.	225	70	..	£5,000	73 KW.	236 inc. ..	
417	TOPSHAM	Topsham Electricity Supply Co., Ltd.	1905	H. C. Gould ..	100	Direct ..	38	18.5	20 KW.	£3,710	103 KW.	77 mtl. ..	9
418	TORQUAY	Torquay Corporation.. ..	1898	S. W. Salt ..	200	50~, 1-ph.	625	318	..	£46,940	763 KW.	58 arc, 307 inc., 150 Nernst	6
419	TOTNES	Electric Supply Corporation Ltd.	1904	K. A. Scott-Moncrieff*	225 & 450	Direct ..	66	30	35 KW.	£18,400	111 KW.	..	6
420	TOTTENHAM	North Metropolitan Electric Power Supply Co.	1908	F. T. Hall (res.)*	415 & 240	50~; 3-ph.	1,000 (sub-stn.)	690	..	£45,988	652.9 KW.	137 arc, 25 mtl	15
421	TRAFFORD PARK ..	Trafford Power & Light Supply (1902) Ltd.	1900	T. A. Kerr ..	250, 500 D.C.* 6,500 A.C.	Direct & 50~, 3-ph.	4,100	2,300	..	..	..	..	
422	TREETON	Treeton Parish Council ..	1897	F. H. Castleman	1,250	Direct ..	12	..	..	..	..	25 arc ..	
423	TUNBRIDGE WELLS ..	Tunbridge Wells Corporation	1895	J. W. Beauchamp (Res.)*	220	67.5~, 1-ph.	1,600	583	..	£91,724	2,200 KW.	22 arc; 57 lg. 440 sml. mtl.	200
424	TWICKENHAM, HAMPTON & TEDDINGTON*	Twickenham & Teddington Electric Supply Co., Ltd.	1902	M. Farrer ..	240 & 480 D.C. 240 & 420 A.C.	Direct & 50~, 3-ph.	1,180	808	250 KW.	£250,265	3,056 KW.	..	108
425	TYNEMOUTH	Tynemouth Corporation ..	1901	C. Turnbull ..	220 & 440 tr. 550	Direct ..	1,070*	1,062	110 KW.	£93,639	1,312 KW.	24 arc, 8 cbn., 144 mtl., 89 N	1,70
426	UXBRIDGE AND DIST.	Uxbridge & District Electric Supply Co., Ltd.	1902	A. Randall Bell	200	50~, 1-ph.	1,100	474	..	£101,275	938 KW.	55 mtl. ..	115
427	VENTNOR, BONCHURCH AND ST. LAWRENCE	Isle of Wight Electric Light and Power Co., Ltd.	1899	A. E. Mayes (Man.)	210	Direct ..	335	198	100 KW.	£56,710	616 KW.	24 arc, 5 cbn., 159 mtl.	35
428	WADEBRIDGE	Wadebridge & District Elec. Supply Co.	1900	T. A. Harold Salmon	140	Direct ..	100	30	67 KW.	..	..	33 mtl. ..	8
429	WAKEFIELD	Wakefield Corporation ..	1898	H. A. Nevill ..	200	60~, 2-ph.	2,250	1,512	..	£95,499	..	64 arc, 78 mtl.	239
430	WALLASEY	Wallasey Corporation ..	1897	J. A. Crowther..	100 & 200 A.C. 500 D.C.	50~, 1-ph., & direct	2,550	1,501	800 A.	£111,716*	4,314 KW.	60 arc, 120 inc.	104
431	WALSALL	Walsall Corporation	1895	A. S. Barnard ..	105 & 210 D.C.	Direct and 50~, 3-ph.	1,730	1,119	..	£135,893	1,655 KW.	19 arc, 22 mtl.	238
432	WALTHAMSTOW ..	Walthamstow Urban District Council	1901	G. R. Spurr ..	210 & 365 A.C.* 230 & 460	Direct ..	3,200	2,101	250 KW.	£213,871	2,192 KW.	247 arc, 660 inc., 203 mtl.	313
433	WALTON-ON-NAZE ..	Coast Development Corporation	1903	E. A. Lambert ..	230	Direct ..	100	90	65 KW.	..	145 KW.	1 arc, 105 mtl.	2
434	WARRINGTON	Warrington Corporation ..	1900	F. V. L. Mathias	230, 460 D.C. 220, 380 A.C.*	Direct, & 50~, 3-ph.*	3,150	1,953	..	£106,408	4,008 KW. (inc. mtrs.)	34 arc, 53 mtl.	
435	WATFORD	Watford Urban District Council	1899	F. W. Purse ..	200	50~, 1-ph.	1,130	577	56 KW. for 2 h.	£88,520	1,405 KW.	18 arc, 2170 cn.,* 100 mtl. (apprx)	110
436	WEDNESBURY	Wednesbury Corporation ..	1904	W. Fennell	230 & 460	Direct ..	540	517	220 KW. for 1½h.	£35,000 (approx.)	639 KW.	..	823
437	WELLINGBOROUGH ..	Wellingborough Electric Supply Co., Ltd.	1903	Wm. J. S. Jones	230 & 460	Direct ..	300	230	85 KW.	..	391 KW.	231 inc., 6 Nernst	21
438	WEST BROMWICH ..	West Bromwich Corporation	1901	W. A. Jackson..	230 & 460 tr. 500	Direct ..	2,300	1,600	175 KW.	£79,950	678 KW.	81 arc, 160 mtl.	311
439	WEST HAM	West Ham Corporation ..	1899	H. Herbert Couzens	100 to 500 D.C.*	50~, 1 & 2-ph., & direct	11,400	6,859	400 KW.	£435,000 (approx.)	3,906 KW.	362 arc, 232 mtl.	999
440	WEST HARTLEPOOL ..	West Hartlepool Corporation	1901	H. F. Friederichs	230 & 460	Direct ..	1,500	1,047	69 KW.	£94,128	1,819 KW.	324 mtl. ..	946
441	WESTON-SUPER-MARE	Weston-super-Mare & District Electric Supply Co., Ltd.	1901	G. Charlton ..	230 & 460	Direct ..	1,100	502	50 KW.	..	810 KW.	..	24
442	WEYBRIDGE AND WALTON-ON-THAMES	Urban Electric Supply Co., Ltd.	1902	Herbert W. Watts	240 & 480	Direct ..	780	421	45 KW.* 175 KW.†	£127,818	1,789 KW.	70 (ave. 87 watts) mtl.	65
443	WEYMOUTH & MELCOMBE REGIS	Weymouth Corporation ..	1904	Jos. H. Bolam ..	230 & 460	Direct ..	694	403	180 KW.	£55,145	908 KW.	48 arc, 22 N., 680 mtl.*	62 (H
444	WHITBY	Whitby Urban District Council	1903	L. H. King ..	230 & 460	Direct ..	400	191	23 KW.	£38,400	371 KW.	31 arc, 100 cbn. 210 mtl.	
445	WHITCHURCH AND PANGBOURNE	Whitchurch and Pangbourne Electric Supply Co., Ltd.	1903	D. H. Coombs ..	240 & 480	Direct ..	108	82	30 KW.	£6,250	90 KW.	..	1
446	WHITEHAVEN	Whitehaven Corporation ..	1898	B. Sankey ..	210, 420, & 440	Direct ..	531	263	105 KW.	£49,503 (1911)	729 KW.	531 mtl.*	41
447	WIGAN	Wigan Corporation	1900	J. Slevin ..	230 & 460 tr. 550	Direct ..	3,930	2,554	75 KW.	£190,156	1,636 KW.	54 arc, 586 mtl.	2
448	WILLESDEN	Willesden Urban District Council	1903	J. G. Bruce ..	240 & 480	Direct and 50~, 1-ph.	900	1,395	97 KW.	£195,734	2,943 KW.	212 arc, 230 cbn., 19 mtl.	221
449	WIMBLEDON, MERTON, MALDENS & COOMBE	Wimbledon Corporation ..	1899*	H. Tomlinson-Lee	220 D.C. & A.C.	50~, 1-ph.	3,685	1,570	..	£230,621	6,600 KW.	89 arc, 1,141 mtl.	15
450	WINCHESTER	Winchester Corporation ..	1898	R. Ayton ..	210 & 420	Direct ..	850	415	85 KW.	£96,111	1,334 KW.	..	80
451	WINDERMERE AND AMBLESIDE	Windermere & District Electricity Supply Co., Ltd.	1898	C. Walker (Man.)	100 & 200	100~, 1-ph.	275	134	..	£43,298	433 KW.	129 cbn. ..	20
452	WINDSOR & ETON ..	Windsor Electrical Installation Co., Ltd.	1896	A. E. Farrow ..	110 & 220	Direct & 50~, 1-ph.	580 D.C., 100 A.C.*	421	180 KW.	£90,350	1,661 KW. inc. pr. & hg	Eton, 12 arc, 53×2 mtl.	76
453	WISHAW	Wishaw Corporation	1905	Ernest F. Cox ..	240 & 480	Direct ..	300	220	..	£32,200	581 KW.	60 arc, 78 N.. 100 c.p. mtl.	109
454	WITNEY	Witney Urban District Council	1900	F. G. Curel ..	220	Direct ..	120	80	18.4 KW.	£10,518	250 KW.	..	7
455	WOKING	Woking Electric Supply Co., Ltd.	1899	J. G. McLean ..	200	100~, 1-ph.	1,175	502	..	£116,550	..	..	14
456	WOLVERHAMPTON ..	Wolverhampton Corporation	1895	C. E. C. Shawfield	230 & 440 D.C. 230, 400 A.C.*	Direct & 50~, 3-ph.	7,150	4,905	995 KW & 850 KW.	£247,592 (1910)	2,548 KW.	63 arc, 459 mtl. 195 N.	569
457	WORCESTER	Worcester Corporation ..	1894	C. M. Shaw ..	230, 460 D.C.* 100, 200 A.C.	50~, 3-ph., & direct	2,236	987	150 KW.	£158,077	2,890 KW.	46 arc, 11 grp. & 375×2 mtl.	248
458	WORKSOP	Worksop Urban District Council	1901	J. Percival Crowther	220 & 440	Direct ..	540	296	..	£31,244	671 KW.	87 arc, 213 mtl.	61
459	WORMIT	Tayside Electric & Gas Light Co., Ltd.	1898	E. A. Stewart ..	230	Direct ..	45	20	..	..	234 KW.	..	
460	WORTHING	Worthing Corporation ..	1901	G. Porter ..	230 & 460	Direct ..	804	456	210 KW.	£30,500	1,375 KW.	110 arc, 323 mtl.	64
461	WREXHAM	Wrexham Corporation ..	1901	W. G. Pickvance	220 & 460 tr. 500	Direct ..	750	460 lg., 200 tr.	..	£45,000	930 KW	45 arc, 184 mtl., 25 N.	60
462	YARMOUTH	Yarmouth Corporation ..	1895	G. Bryant ..	100 & 200 tr. 550	38~, 1-ph.	1,650	1,142	..	£107,022	903 KW.	189 arc, 226 mtl.	98
463	YORK	York Corporation . ..	1903	J. W. Hume ..	220 & 460 D.C. 3,300 A.C.	Direct & 50~, 3-ph.	3,110	2,098	600 KW.	£145,178	2,293 KW.	108 arc, 124 mtl.	23
464	YSTRADCYNLAIS ..	Giantawe Electric Supply Co. Ltd.	1910	R. P. Coates ..	240 & 230	Direct ..	170	50	32 KW.; s. stn. 35 KW.	..	33 KW.	279 mtl. ..	2

w.	94 arc, 486×2 cbn.	80=2,800 H.P.	70=2,100 H.P.	5,478 KW.	..	Lg. 7 & 1½, or 4; pb. lg. arc £2.3½*; pr. 1½ to 1; htg. 2; tr. 1.5 to 1.3	Max. dem, flat, & sl. scale w. dis.	3,200,000	Lighting & traction. *Also pb. lg. two 16-C.P. ins., £3 12s. per annum. Data to Feb. 1910	333
v.	21 KW. ..	204 KW. (inc. pr. & hg.)	..	672 KW.	..	Lg. 4; pr. 2½ to 1½	..	..	*Used as stand-by; bulk from Cd. & Dm. E. P. S. Co. Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	334
	16 arc ..	104=590 H.P.	..	940 KW.	..	Lg. 4 to 5; pr. 2½ to 1	Flat rate w. dis. ..	587,094	Data to March 31, 1911	335
..	..	260=6,000 H.P.	120=3,000 H.P.	8,000 KW.	..	Lg. 3½, less ½, or 4 & 2; pr. 2½ to 3; tr. ⅔	Flat, sl. sc., cont. w. dis., & 2-rate	15,000,000	Lighting & traction. Data to May 1, 1912	336
..	..	85	..	1,039 KW.	..	Lg. 7 & 3, or 5, cont.; pr. 4 & 1, or 2½ or cont., & special	Max. dem., flat, 2-rate, con., t. sw., & sp.	243,942	Wiring and motors on hire purchase 3, 5, or 7 years. Data to Dec. 31, 1911	337
v.	60 arc, 46 cbn., 214 mtl.	84=273 H.P.	..	..	..	Lg. 7 & 2, or 4; pr. 4 to 1; htg. 1½	Max. dem., flat & 2-rate; pr. sl. sc.	877,808	Data to May 15, 1911	338
v.	49 arc, 2 inc., 1 Nernst	73=428 H.P.	90=3,150 H.P.	4,472 KW.	..	Lg. 4; pb. lg. arc £11½ p.a.; pr. 1½*; tr. 1½	Flat rate	1,319,000	Lighting & traction. *Special rates to large consumers	339
w.	Arc 25.3 KW. 44 600-c.p. mtl.	142=860 KW.	..	1,675 KW.	169 KW.	Lg. 6 & 2, or 4; pb. lg. 2.83; pr. 2 to 1	Max. demand, flat & 2-rate (t.s.) w. dis.	1,020,388	Data to Mar. 31, 1912	340
..	..	1,000 KW. ..	..	1,640 KW.	..	Lg. 7 & 2 (churches), 4; pr. 1½ to 1	Max. dem, flat, sl. sc. & cont. w. dis.	1,172,174	Data to Mar. 31, 1912	341
..	..	25=40 H.P. ..	..	129 KW.	..	Lg. 8 & 6; pr. 6 to 3	Flat rate	..	Gas power	342
v.	..	22=144 H.P. Htg. 15 KW.	..	825 KW.	86 KW.	Lg. 5; pr. 2½, 2, 1½; htg. 1½ ..	Flat rate w. dis. ..	142,406	Data to Dec. 31, 1911	343
v.	99 arc, 133 mtl.	59=403.5 H.P.	See other Table	1,055 KW. (ex. tr.)	..	Lg. 4½, or £7 per KW. p.a. & 1½ p.u.*; pr. 3 to 1†; tr. 1.131	Flat rate, sl. sc. & Hopkinson	2,035,951	Lg. and tr. *Pb. lg. arc £20 (½ nt. £12), inc. £2½, p.a. †Or £1 per B.H.P. per qr. & ¼d. p.u. Data to Mar. 31, 1910	344
w.	215 arc, 463 mtl.	884=12,538 KW.	144=3,704 H.P.	14,544 KW.	752 KW.	Lg. 3.6 to 1½†; pr. 2½ to ⅞, or £3½ per KW. & ½ p.u.; htg. ⅔; tr. 1½	Max. dem., flat & sc.	12,374,591	Lg. & tr., 3 stns. *Tr. 550 v. †Pb. lg. arc £14 3. 8. Inc. 100 C.P. £2 9s. Data to Mar. 31, 1912	345
v.	2 Nernst ..	22=45½ H.P. ..	..	1,032 KW. ..	..	Lg. 7 & 3, or 6; pb. lg. £3½ per lp. p.a.; pr. 4 & 1½, or 2½	Max. demand and flat rate	254,191	*Worked by Callender's Cable and Construction Co., Ltd. Data to Mar. 31, 1909	346
v.	2 arc, 476 mtl., 2 Nernst	23=143.25 H.P.	250 KW.	1,637 KW.	..	Lg. 5½; pb. lg. arc £17½ (½ nt.), inc. & Nernst £3½ p.a.; pr. 2½	Flat rate	482,890	Data to Dec. 31, 1909	347
v.	230 posts, 1,000 c.p. to 50 c.p.	39=185 KW. ..	..	1,230 KW.	116 KW.	Lg. 5½ to 4; pb. lg. 1.25; pr. 2 & 1½, also contract.	Sliding sc. & cont.	447,512	Data to Mar. 31, 1912	348
v.	74 arc, 80 mtl.	1,748 H.P. ..	..	3,845 KW. ..	..	Lg. 6 & 2, or 4½; pb. lg. arc £25 & £11 p.a.; pr. 2 & 1½; tr. 1½ to 1	Max. demand and flat rate	2,400,333	Lighting and traction. Are lighting being extended. Data to Mar., 1909	349
.	21 arc, 341 mtl.	312 H.P. ..	24=858 H.P.	..	..	Lg. 4, or £3 per KW. & 2 p.u.; pb lg. 2.95* av.; pr. 2 w. dis.; tr. 1.	Max. dem., flat rate and special	349,493	Lighting & traction station. *Including maintenance. Data to Mar. 31, 1910	350
v.	2 arc, 24 mtl.	37=243 H.P. ..	..	385 KW.	169 KW.	Lg. 4, or 1s. per 50-w. lp. & 1½d. p.u.; pb. lg. 2½; pr. 1½ and 1	Flat rate† & sl. sc.	89,033	*Lancs. Elec. Pr. Co. manage undertaking. †Alternative fixed charge per lp. & 1½d. p.u. Data to May 15, 1912	351
.	72 arc, 44 cbn., 230 mtl.	101=320 H.P.	12=240 H.P.	1,631 KW.	..	Lg. 6 to 3 (outside arcs 2); pr. 2; tr. 1.2	Max. demand and flat rate	632,582	Lighting and traction. *Purchased from Co. in 1893. Data to Mar. 31, 1909	352
.	13 KW. ..	9 KW. ..	..	142 KW.	..	Lg. 5½; pr. 3 & 1½	Flat rate & sliding scale	..	*C.W. Fairweather (Mgr.). Cons. engrs. Merz & McLellan. Data to Dec. 31, 1911	353
v.	..	31=55 KW.	..	243 KW.	..	Lg. 4½, or 6 & 2; pr. 2	Max. demand & flat rate	89,097	Data to Mar. 31, 1908	354
.	18 arc, 114 mtl.	47=281 H.P.	..	582 KW.	139 KW.	Lg. 6 (outside 3); pb. lg. arc £18, inc. £3½; pr. 3, 2½, 1; htg. 2	Max. demand and flat rate	250,058	Data to Mar. 31, 1912	355
v.	236 inc. ..	..	..	..	..	Lg. 6; pb. lg. £3 per lamp per annum	Flat rate and contract	..	Evanstown supplied for Ogmore C.; 43 street lps. & pte. supply. Lg. of Ely Valley in hand	356
v.	77 mtl. ..	9=23 H.P. ..	..	..	12 KW.	Lg. 5; pr. 3½	Flat rate and contract	27,526	.. ..	357
v.	53 arc, 307 inc., 150 Nernst	6=15 H.P. ..	..	831 KW.	..	Lg. 7 & 3; pb. lg. arc £23, inc. £2½ p.a.; pr. 2½	Max. demand and flat rate	..	.. ..	358
.	..	6=12½ H.P.	..	124 KW. ..	..	Lg. 4½; pr. 3; hg. 1½	Flat rate	30,359	*Resident eng., F. Howlett. Data to Dec. 31, 1909 ..	359
v.	137 arc, 25 mtl	158=923.6 KW.	..	1,598 KW.	293.4 KW.	Lg. 6 & 2, or 4½ less 10%; pb. lg. arc £16 p.a.; pr. 4, 3, 2, 1, or 1½ t sw.	Max. demand, flat, cont. & t. sw.	1,127,383	*Eng.-in-chief, E. T. R. Murray. Data to Dec. 31, 1911	360
	..	..	..	..	..	Lg. 3½, or £7 per KW. & 1½ p.u.; pr. 1½ to 0.7	Max. damand & sl. scale	5,137,384	Lighting & traction. *520 D.C. Data to Mar. 1912 ..	361
	25 arc ..	..	..	..	..	.. ..	..	..	Electricity supplied by Rother Vale Collieries, Ltd. Data to May 18, 1912	362
v.	22 arc; 57 lg. 440 sml. mtl.	200 H.P. ..	..	2,527 KW.	192 KW.	Lg. 4½; pb. lg. 1.97; pr. 1½ ..	Fl. rate, & 2-rate m.	896,143	*H. Boot, Cons. Engr. Data to Mar. 31, 1912	363
	..	108=594 H.P.	..	3,768 KW.	356 KW.	Lg. 7 & 3, or 5½ w. free lamps; pr. 4 & 1½, or 2½ or contract.	Max. dem., fl. rate, 2-rate mtr. & cont.	1,109,676	*Also S. Margaret's o/T., Hamp'n Wick, Esher, Claygate, Hampton Ct. and E. Molesey Data to Dec. 31, 1911	364
w.	24 arc, 8 cbn., 144 mtl., 89 N.	1,782 H.P. ..	25 cars (about)	2,639 KW. (ex. tr.)	153 KW.	Lg. 4 & 2, or 4½†; pr. 2½ & 1½, or 1½ & spl.†; tr. 1½ to 1(T side, 1½)	Max. dem., flat rate, t.sw. & special	1,619,532	Lg. & tr. *Bulk supply, 1,500 KW., from Carville. †Pb. lg., arc £16 & £13; N. £2, p.a. Data to Mar. 31, 1911	365
v.	55 mtl. ..	115=1,380 KW. ..	..	1,917 KW.	65.6 KW.	Lg. 7 (rural), 5 (urban); pb. lg. £2/5/6 per lp. p.a.; pr. 2½*	Max. demand, flat rate, cont. & sp.	760,280	*Or £4 per KW. p.a. and ¾d. p.u. Data to Mar. 31, 1912	366
v.	24 arc, 5 cbn., 159 mtl.	35=70 H.P. ..	..	810 KW.	..	Lg. 6, or contract + 1½; pr. 4 & 1½, or 2½	Max. demand, flat rate & contract	223,529	Data to Dec., 1911	367
	33 mtl. ..	8=10 H.P. ..	..	..	18%	Lg. 7, less 5%; pb. lg. £1½ pr. lp. p.a.; pr. 4, less 5%	Flat rate w. dis. ..	9,000 (approx.)	Data to Mar. 25, 1912	368
	64 arc, 78 mtl.	239=2,100 H.P.	..	2,455 KW.	..	Lg. 4½; pb. lg. arc £13½, inc. £2½ & £1/18 p.a.; pr. 2 to ⅔ (hoists, 2)	Flat rate	1,857,185	Data to Mar. 31, 1912	369
v.	60 arc, 120 inc.	104=453 H.P.	See other Table	4,692 KW.	..	Lg. 3½ to 3; pb. lg. arc £20 p.a.; pr. 2; tr. 1.4; htg. 1½	Sliding scale and flat rate	2,515,105*	Lighting and traction. *To Mar., 1911. Data to April, 1912	370
w.	19 arc, 22 mtl.	238=1,219 H.P.	36cars=576KW	3,208 KW.	589 KW.	Lg. 6 & 2, or 4; pb. lg. £488 p.a.; pr. 2 to 1½; tr. 1½. Bulk spl.	Max. dem., flat rate w. dis. & special	2,011,807	Lighting and traction. *Traction, 500v. Data to Dec. 31, 1911	371
w.	247 arc, 660 inc., 203 mtl.	313=2,526 H.P.	See other Table	4,276 KW. (ex. tr.)	..	Lg. 3½ w. dis.; pb. lg. 3 & 2; pr. 1½ to ⅔; tr. 1½	Flat rate	4,701,155	Lighting and traction. Gas power. Data to Mar. 31, 1912	372
v.	1 arc, 105 mtl.	2=6 H.P. ..	1=15 H.P.	165 KW. ..	..	Lg. 6; pb. lg. arc £12, mtl. £3/12/6 p.a.	Flat rate	72,000	Lighting and traction. Data to Mar. 25, 1910	373
w. rs.)	84 arc, 53 mtl.	..	42=798 H.P.	4,883 KW.	824 KW.	Lg. 6 & 3, or 4 (ch. 3½); pb. lg. £620 p.a.; pr. 2 & 1; tr. 1½. No mtr. rent	Max. dem., flat w. dis., pr. sl. scale†	8,187,879	Lighting and traction. *220 volts 1-ph., 380 v. 3-ph.; tr. 500 v. D.C. †Also special terms. Data to Mar. 31, 1912	374
v.	18arc, 2170cn.,* 100mtl. (apprx)	110=420 H.P.	..	1,799 KW.	..	Lg. 7 & 3, or 5; pb. lg. 3; pr. 2 to 1	Max. dem., flat, sl. scale & 2-rate w.t.sw.	958,000 (estd.)	*Total equivalent 32-watt lamps. Data to Mar. 31, 1909	375
v.	..	823 KW. ..	..	1,432 KW.	200 KW.	Lg. 3½ to 2½; pr. 1½ to ⅔ ..	Max. demand, flat rate & 2-rate meter	854,930	Mond gas power station. Data to March 31, 1912 ..	376
w.	231 inc., 6 Nernst	21=150 H.P.	..	483 KW.	..	Lg. 4½; pb. lg. 2½; pr. 2½ & 3½ (2-rate, 1 & 3)	Flat rate with dis.	183,000	Data to Dec. 31, 1911	377
w.	81 arc, 160 mtl.	211=2,930 H.P.	30=900 H.P.	3,900 KW.	456 KW.	Lg. 4½ & 1½, or 3½; pb. lg. 0.95*; pr. 1½ to 0.5; tr. 2 to 1	Max. dem., flat rate, sl. sc., & cont. w. dis.	2,954,427	Lg. & tr. *Pb. lg. £15 p.a., 2 arcs to 11 p.m., 50-C.P. to dawn; 32s., 2 25-C.P. mtl. 11 to dn. Data to Mar. 31 1912	378
w.	302arc, 293mtl.	999=7,762 KW.	3,730 KW. ..	15,761 KW.	..	Lg. 3 less dis.; pb. lg. 1.5; pr. 1 less dis.; tr. 0.95	Flat rate, with dis., contract, special	19,156,899	*Lighting and traction; also 100 to 6,000 v. A.C., & tr. 500 D.C. Data to Mar. 31, 1910	379
w.	324 mtl. ..	246=2,089 H.P	..	3,854 KW.	62 KW.	Lg. 4 & 3, or 6 & 2 m.d.; pb. lg. 1; pr. 2 to ⅔; ckg. 1	Max. dem. & flat rate; pr. sl. scale	2,197,123	Data to Mar. 31, 1912	380
w.	..	24=198 H.P.	24=480 H.P.	1,483 KW.	85 KW.	Lg. 7 & 2, or 5; pr. 4½ & 1½, or 2½; tr. 2	Max. demand and flat rate	472,024	Lighting and traction. Data to Dec. 31, 1911	381
w.	70 (ave. 87 watts) mtl.	65=162 H.P.	..	2,182 KW.	140 KW.	Lg. 7 & 3, or 5½ (slot m., 7 incl.); pr. 4 & 1½, or 2½	Max. dem., cont., fl. rate & prepayment	564,670	*Weybridge, †Walton. Energy transmitted to Walton at 2,500 v. D.C. Data to Dec. 31, 1911	382
w.	48 arc, 22 N., 680 mtl.*	62=268 KW. (Htg. 53 KW.)	..	1,243 KW.	148 KW.	Lg. 5, pr. 2½, w. dis.; pb. lg. arc £15½, inc. £4, per post p.a.*	Flat rate with discounts	523,667	*Two cbn. lamps on arc posts; 340 posts with 2 or 4 mtl. lamps=380 lamps. Data to Mar. 31, 1912	383
w.	31 arc, 100cbn. 210 mtl.	339 H.P.	..	585 KW.	..	Lg. 4½, or £15 per KW. & 1d. p.u.; pr. 2,1½ & 1 or £5 p. KW. & 1d.*	Max. dem., flat rate, 2-rate & cont.	255,000	*Pb. lg. 3; hg £1 & 1d. Data to Mar. 31, 1910	384
w.	..	1=6½ H.P.	..	94 KW.	..	Lg. 8; pr. 2, 3 & 4	Flat rate and contract with dis.	27,220	Connections increased, but demand reduced owing to mtl. filament lamps. Data to Dec. 31, 1909	385
w.	571 mtl,*	44=235 H.P.	..	759 KW.	47 KW.	Lg. 4½†; pb. lg. 4; pr. 2 to 1, or 4½ & 1½ to 1 by 2-rate meter	Hopkinson, flat rate sl. scale & 2-rate	391,548	*9 4-lt. Osram lanterns. †Or £3 per an. per KW. & 2d. per unit. Data to Mar.31, 1912	386
KW.	54 arc, 586 mtl.	294=2,979 H.P.	183=4,480 H.P.	6,582 KW.	395 KW.	Lg. 5, 4, 3; pb. lg. 3; pr. 1 & ½; htg. 2; tr. 1½	Flat rate with discounts	4,001,187	Lighting and traction. Data to Mar. 31, 1912	387
w.	212 arc, 200 cbn., 19 mtl.	221=984 H.P.	..	3,623 KW.	..	Lg. 8 & 1, or 5; pb. lg. arc £13 4s., mtl. £3 6s.; pr. 1½ to 0.58	Max. demand & flat rate	2,308,220	Bulk supply from North Met. E. P. S. Co. Data to Mar. 31, 1910	388
KW.	89 arc, 1,141 mtl.	157=1,040½ H.P.	..	7,900 KW.	580 KW.	Lg. 4½ to 3½; pb. lg. 2½; pr. 1 (above 2 H.P., 1½)†	Flat rate & sliding scale	2,343,289	*Merton, 1908; Maldens & Coombe, 1911. †Maldens, lg. 6; pr. 2. Mtrs of 863 B.H.P. pumping sewage. Data to 31/3/12	389
KW.	..	89=165 H.P.	..	1,560 KW.	78 KW.	Lg. 7, 4, & 2; pr. 4 & 1½; htg. 3 & 1, or 2	Max. demand, flat rate & contract	507,528	Data to Mar. 31, 1912	390
w.	129 cbn. ..	20=30 H.P. ..	..	498 KW. ..	..	Lg. 7; pb. lg. 3; pr. 3½	Flat rate	113,427	Data to Dec. 31, 1911	391
w. &hg	Eton, 12 arc, 55×2 mtl.	76=208 H.P.	..	1,666 KW.	..	Lg. 6 w. dis.; pr. £3 p.a. per H.P. & 1d. p.u.; hg. 8 w. dis.†	Max. dem. & flat rate w. discount	550,657	*Addn'l b'lk s'ply from Slough & Datchet Co. †Pb. lg. arc £22, £16; twin tant. £4½ p.a. Data to Dec. 31, 1911	392
w.	60 arc, 78 N., 100 c.p. mtl.	103=330 H.P.	..	820 KW.	..	Lg. 4; pb. lg. £1,000 p.a.; pr. 3 to 1	Flat rate	329,211	Data for 1911	393
w.	..	7=55 H.P.	..	250 KW.	50 KW.	Lg. 6 & 5; pr. 2½	Flat rate	44,421	Gas power. Data to Dec. 31, 1911	394
	..	14=50 H.P.	..	1,700 KW.	..	Lg. 6½; pr. 4 & 2; htg. 2 ..	Flat rate	619,813	Bulk supply at 2,000 volts to L. & S. W. Ry. Co. Data to Dec. 31, 1908	395
KW.	62 arc, 459 mtl. 198 N.	569=5,718 H.P.	104=2,000 KW.	6,722 KW.	..	Lg. 5 & 2, or 4 & 2½; pb. lg. arc £17, inc. £22 p.a.; pr. 1†; tr. 1	Max. dem., flat, & contract	10,622,081	*Lighting and traction. *Tr. 500 v. †Electrolytic works, ½d. p.u. Data to Mar. 31, 1912	396
KW.	45 arc, 11 grp. & 375 x 2 mtl.	243=1,581 H.P	30=750 H.P.	..	466 KW.	Lg. 6½ & 3, or 4½; pb. lg. 1.5; pr. 3½ & 1 (rest. hrs. 1); tr. 2 to 1½	Max. demand, flat rate & sl. scale	1,764,017	Lighting and traction; old station water power plant only. *Traction 500 v. Data to Mar. 31, 1912	397
w.	37 arc, 212 mtl.	61=321 H.P.	..	1,007 KW.	11.5%	Lg. 4; pb. lg. arc £15, inc. £5; pr. 1½, or 4 & 1 (2-rate); htg. 1	Flat rate with dis., t. sw., spl., & 2-rate	401,428	Data to Mar. 31, 1912	398
w.	..	.. .. ..	..	234 KW.	..	Lg. 5	Flat rate and con.	5,000	Suction-gas plant. Data to April 12, 1910	399
KW.	110 arc, 823 mtl.	64=235 H.P.	..	1,443 KW.	182 KW.	Lg. 7, 5, 4½, 3, 2, 1½, 1; pb. lg. 5; pr. 1½	Flat rate and 2-rate mtr., with dis., & sp.	578,282	Data to Mar. 31, 1912	400
w	45 arc, 184 mtl., 25 N.	60=221 H.P.	20=500 H.P.	1,412 KW.	65 KW.	Lg. 5, or 5 & 2½ (½ dis.), cont. arc 3½*; pr. 2½ to 1½ (½ dis.); tr. 1.695 to 1.475	Flat rate & sliding scale with dis.	710,500	Lg. & tr. *Also 12½% on net ast. & 1d. p.u. 1 Pb. lg. arc £20, £15, N. £4½, inc. £3 3s. & £2½. Data to Mar.31., '12	401
KW.	190 arc, 230 mtl.	58=70 H.P. ..	..	..	..	Lg. 5, less 5%; pb. lg. arc, £16 p.a.; pr. 2½ A.C., 2 D.C.	Max. dem., flat rate w. dis., cont., t. sw.	1,610,554	Lighting and traction. Data to Mar. 31, 1910	402
KW.	108 arc, 134 mtl.	268=1,692 H.P.	..	3,562 KW.	188 KW.	Lg. 7 & 1½, or 4½ to 3½, ch., &c., 3; pr. 1½ to 1†; tr. 2 to 1½	Max. dem., flat, 2-rate mtr., spl. & cont.	3,610,963	Lg. and tr. *Tr. 500 v. †Pb. lg. arc (open) £17, (enc.) per pair £12 12/0; inc., £2 17s. p.a. Data to Mar. 31, 1912	403
w.	279 mtl. ..	2=3 H.P. ..	..	60 KW. ..	25 KW.	Lg. 5; pr. 3½	Flat rate	16,061	Data to May 4, 1912	404

422	TREETON	Treeton Parish Council ..	1897	F. H. Castleman	1,250	Direct ..	18	..	..	..	..	25 arc ..	
423	TUNBRIDGE WELLS ..	Tunbridge Wells Corporation	1895	J. W. Beauchamp (Res.)*	230	67.5~, 1-ph.	1,600	588	..	£91,724	2,200 KW.	22 arc; 57 lg. 440 sml. mtl.	20
424	TWICKENHAM, HAMPTON & TEDDINGTON*	Twickenham & Teddington Electric Supply Co., Ltd.	1902	M. Farrer ..	240 &480 D.C. 240 & 420 A.C.	Direct & 50 ~, 3-ph.	1,180	808	250 KW.	£250,265	3,056 KW.	..	10
425	TYNEMOUTH	Tynemouth Corporation ..	1901	C. Turnbull ..	220 & 440 tr. 550	Direct ..	1,070*	1,062	110 KW.	£93,589	1,312 KW.	24 arc, 8 cbn., 144 mtl., 89 N	1,7
426	UXBRIDGE AND DIST.	Uxbridge & District Electric Supply Co., Ltd.	1902	A. Bandall Bell	200	50~, 1-ph.	1,100	474	..	£101,375	936 KW.	55 mtl. ..	115
427	VENTNOR, BONCHURCH AND ST. LAWRENCE	Isle of Wight Electric Light and Power Co., Ltd.	1899	A. E. Mayes (Man.)	210	Direct ..	335	193	100 KW.	£56,710	616 KW.	24 arc, 5 cbn., 159 mtl.	35
428	WADEBRIDGE	Wadebridge & District Elec. Supply Co.	1909	T. A. Harold Salmon	140	Direct ..	100	30	67 KW.	..	..	33 mtl. ..	3=
429	WAKEFIELD	Wakefield Corporation ..	1898	H. A. Nevill ..	200	60~, 2-ph.	2,250	1,512	..	£95,499	..	64 arc, 78 mtl.	239
430	WALLASEY	Wallasey Corporation ..	1897	J. A. Crowther..	100 & 200 A.C. 500 D.C.	50~, 1-ph., & direct	2,550	1,591	800 A.	£111,716*	4,314 KW.	60 arc, 120 inc	10
431	WALSALL	Walsall Corporation	1895	A. S. Barnard ..	105 &210 D.C.	Direct and	1,780	1,119	..	£135,893	1,655 KW.	19 arc, 22 mtl.	228
432	WALTHAMSTOW ..	Walthamstow Urban District Council	1901	G. B. Spurr ..	210&365A.C.* 230 & 460	50~, 3-ph. Direct ..	3,200	2,101	250 KW.	£213,371	2,192 KW.	247 arc, 660 inc., 208 mtl.	313
433	WALTON-ON-NAZE ..	Coast Development Corporation	1908	E. A. Lambert ..	230	Direct ..	100	90	65 KW.	..	145 KW.	1 arc, 105 mtl.	2=
434	WARRINGTON	Warrington Corporation ..	1900	F. V. L. Mathias	230, 460 D.C. 230, 380 A.C.*	Direct, & 50~, 3-ph.*	3,150	1,953	..	£106,408	4,008 KW. (inc. mtrs.)	84 arc, 58 mtl.	
435	WATFORD	Watford Urban District Council	1899	F. W. Purse ..	200	50~, 1-ph.	1,130	577	56 KW. for 2 h.	£88,520	1,405 KW.	18arc, 2170cn.,* 100mtl. (apprx)	110
436	WEDNESBURY	Wednesbury Corporation ..	1904	W. Fennell	230 & 460	Direct ..	540	517	220 KW. for 1½h.	£35,000 (approx.)	639 KW.	..	82
437	WELLINGBOROUCH ..	Wellingborough Electric Supply Co., Ltd.	1903	Wm. J. S. Jones	230 & 460	Direct ..	300	230	85 KW.	..	391 KW.	231 inc., 6 Nernst	21
438	WEST BROMWICH ..	West Bromwich Corporation	1901	W. A. Jackson..	230 & 460 tr. 500	Direct ..	2,300	1,600	175 KW.	£79,950	678 KW.	81 arc, 160 mtl.	211
439	WEST HAM	West Ham Corporation ..	1899	H. Herbert Couzens	100 to 500 D.C.*	50~, 1 & 2-ph., & direct	11,400	6,859	400 KW.	£435,000 (approx.)	3,906 KW.	362arc, 232mtl.	999
440	WEST HARTLEPOOL ..	West Hartlepool Corporation	1901	H. F. Friederichs	230 & 460	Direct ..	1,500	1,047	69 KW.	£94, 128	1,819 KW.	324 mtl. ..	246
441	WESTON-SUPER-MARE	Weston-super-Mare & District Electric Supply Co., Ltd.	1901	G. Charlton ..	230 & 460	Direct ..	1,100	502	50 KW.	..	810 KW.	..	24
442	WEYBRIDGE AND WALTON-ON-THAMES	Urban Electric Supply Co., Ltd.	1902	Herbert W. Watts	240 & 480	Direct ..	780	421	45 KW.* 175 KW.†	£127,318	1,789 KW.	70 (ave. 87 watts) mtl.	65
443	WEYMOUTH & MELCOMBE REGIS	Weymouth Corporation ..	1904	Jos. H. Bolam ..	230 & 460	Direct ..	694	408	180 KW.	£55,145	908 KW.	48 arc, 22 N., 680 mtl.*	62
444	WHITBY	Whitby Urban District Council	1902	L. H. King ..	230 & 460	Direct ..	400	191	23 KW.	£38,400	371 KW.	31 arc, 100cbn. 240 mtl.	(E
445	WHITCHURCH AND PANGBOURNE	Whitchurch and Pangbourne Electric Supply Co., Ltd.	1903	D. H. Coombs ..	240 & 480	Direct ..	108	83	30 KW.	£6,250	90 KW.	..	1
446	WHITEHAVEN	Whitehaven Corporation ..	1893	B. Sankey ..	210, 420, & 440	Direct ..	531	263	105 KW.	£49,503 (1911)	729 KW.	51 mtl.*	41
447	WIGAN	Wigan Corporation	1900	J. Slevin ..	230 & 460 tr. 550	Direct ..	3,320	2,554	75 KW.	£190,156	1,676 KW.	54 arc, 586 mtl.	9
448	WILLESDEN	Willesden Urban District Council	1903	J. G. Bruce ..	240 & 480 D.C. & A.C.	Direct and 50~, 1-ph.	900	1,395	97 KW.	£195,724	2,943 KW.	212 arc, 200 cbn., 19 mtl.	22
449	WIMBLEDON, MERTON, MALDENS & COOMBE	Wimbledon Corporation ..	1899*	H. Tomlinson-Lee	220	50~, 1-ph.	3,685	1,570	..	£230,621	6,600 KW.	89 arc, 1,141 mtl.	1
450	WINCHESTER	Winchester Corporation ..	1898	R. Ayton ..	210 & 420	Direct ..	850	415	85 KW.	£93,111	1,334 KW.	..	80
451	WINDERMERE AND AMBLESIDE	Windermere & District Electricity Supply Co., Ltd.	1893	C. Walker (Man.)	100 & 200	100~, 1-ph.	275	134	..	£43,828	483 KW.	129 cbn. ..	2
452	WINDSOR & ETON ..	Windsor Electrical Installation Co., Ltd.	1896	A. E. Farrow ..	110 & 220	Direct & 50~, 1-ph.	530 D.C., 100 A.C.*	421	180 KW.	£90,350	1,663 KW. inc. pr. & hg	Eton, 12 arc, 58×2 mtl.	76
453	WISHAW	Wishaw Corporation	1905	Ernest F. Cox ..	240 & 480	Direct ..	300	230	..	£22,230	581 KW.	60 arc, 78 N.. 100 c.p. mtl.	10
454	WITNEY	Witney Urban District Council	1900	F. G. Curel ..	220	Direct ..	120	80	18.4 KW.	£10,518	250 KW.	..	7
455	WOKING	Woking Electric Supply Co., Ltd.	1890	J. G. McLean ..	200	100~, 1-ph.	1,175	503	..	£116,550	..	..	14
456	WOLVERHAMPTON ..	Wolverhampton Corporation	1895	C. E. C. Shawfield	220 & 440 D.C. 230,400 A.C.*	Direct & 50~, 3-ph.	7,150	4,905	385 KW & 850 KW.	£247,592 (1910)	2,548 KW.	62 arc, 459 mtl. 195 N.	569
457	WORCESTER	Worcester Corporation ..	1894	C. M. Shaw ..	230,460 D.C.* 100, 200 A.C.	50~, 2-ph., & direct	2,236	987	150 KW.	£153,077	2,890 KW.	46 arc, 11 grp. & 375×2 mtl.	243
458	WORKSOP	Worksop Urban District Council	1901	J. Percival Crowther	220 & 440	Direct ..	540	296	..	£31,244	671 KW.	37 arc, 212 mtl.	61
459	WORMIT	Tayside Electric & Gas Light Co., Ltd.	1898	E. A. Stewart ..	230	Direct ..	45	20	..	..	234 KW.	..	
460	WORTHING	Worthing Corporation ..	1901	G. Porter ..	230 & 460	Direct ..	804	456	210 KW.	£69,500	1,275 KW.	110 arc, 333 mtl.	64
461	WREXHAM	Wrexham Corporation ..	1901	W. G. Pickvance	230 & 460 tr. 500	Direct ..	750	460 lg., 200 tr.	..	£45,090	980 KW	45 arc, 184 mtl., 25 N.	60
462	YARMOUTH.	Yarmouth Corporation ..	1895	G. Bryant ..	100 & 200 tr. 500	88~, 1-ph.	1,650	1,142	..	£107,026	902 KW.	189 arc, 226 mtl.	38
463	YORK	York Corporation . ..	1900	J. W. Hame ..	230 & 460 D.C. 3,300 A.C.	Direct & 50 ~, 3-ph.	3,110	2,088	600 KW.	£145,178	2,283 KW.	108 arc, 124 mtl.	28
464	YSTRADGYNLAIS ..	Glantawe Electric Supply Co. Ltd.	1910	R. P. Coates ..	240 & 220	Direct ..	170	50	62 KW.; s. stn. 35 KW.	..	33 KW.	279 mtl. ..	2=

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	25 arc ..	..	..	..	..	pr. 1½ to 0.7	scale ..	..	Electricity supplied by Rother Vale Collieries, Ltd. Data to May 13, 1912	422
W.	23 arc; 57 lg. 440 sml. mtl.	200 H.P. ..	..	2,527 KW.	193 KW.	Lg. 4½; pb. lg. 1.97; pr. 1½ ..	Fl. rate, & 2-rate m.	896,143	*H. Boot, Cons. Engr. Data to Mar. 31, 1912	423
W.	..	108=594 H.P.	..	3,768 KW.	856 KW.	Lg. 7 & 3, or 5½ w. free lamps; pr. 4 & 1½, or 2½ or contract.	Max. dem., fl. rate, 2-rate mtr. & cont.	1,109,676	*Also S. Margaret's o/T., Hamp'n Wick, Esher, Claygate, Hampton Ct. and E. Molesey Data to Dec. 31, 1911	424
W.	24 arc, 8 cbn., 144 mtl., 89 N	1,782 H.P. ..	25 cars (about)	2,689 KW. (ex. tr.)	153 KW.	Lg. 5 & 2, or 4½†; pr. 2½ & 1½, or 1½ & spl.; tr. 1½ to 1(T side, 1½)	Max. dem., flat rate, t.sw. & special	1,619,522	Lg. & tr. *Bulk supply, 1,500 KW., from Carville. †Pb. lg., arc £16 & £13; N. £2, p.a. Data to Mar. 31, 1911	425
W.	55 mtl. ..	115=1,380 KW.	..	1,917 KW.	65.6 KW.	Lg. 7 (rural), 5 (urban); pb. lg. £2/5/6 per lp. p.a.; pr. 2½*	Max. demand, flat rate, cont. & sp.	760,280	*Or £4 per KW. p.a. and ¾d. p.u. Data to Mar. 31, 1912	426
W.	24 arc, 5 cbn., 159 mtl.	35=70 H.P.	..	810 KW.	..	Lg. 6, or contract + 1½; pr. 4 & 1½, or 2½	Max. demand, flat rate & contract	221,529	Data to Dec., 1911	427
	33 mtl. ..	3=10 H.P. .	..	..	18%	Lg. 7, less 5%; pb. lg. £1½ pr. lp. p.a.; pr. 4, less 5%	Flat rate w. dis. ..	9,000 (approx.)	Data to Mar. 25, 1912	428
	64 arc, 78 mtl.	239=2,100 H.P.	..	2,455 KW.	..	Lg. 4½; pb. lg. arc £13½, inc. £2½ & £1/18 p.a.; pr. 2 to ⅔ (hoists, 2)	Flat rate	1,857,185	Data to Mar. 31, 1912	429
W.	60 arc, 120 inc	104=453 H.P.	See other Table	4,692 KW.	..	Lg. 3½ to 3; pb. lg. arc £20 p.a.; pr. 2; tr. 1.4; htg. 1½	Sliding scale and flat rate	2,515,105*	Lighting and traction. *To Mar., 1911. Data to April, 1912	430
W.	19 arc, 29 mtl.	238=1,219 H.P.	36cars=576KW	3,208 KW.	589 KW.	Lg. 6 & 2, or 4; pb. lg. £488 p.a.; pr. 2 to 1½; tr. 1½. Bulk spl.	Max. dem., flat rate w. dis. & special	2,011,807	Lighting and traction. *Traction, 500v. Data to Dec. 31, 1911	431
W.	247 arc, 660 inc., 203 mtl.	313=2,526 H.P.	See other Table	4,276 KW. (ex. tr.)	..	Lg. 3⅔ w. dis.; pb. lg. 3 & 2; pr. 1½ to ⅔; tr. 1½	Flat rate	4,701,155	Lighting and traction. Gas power. Data to Mar. 31, 1912	432
W.	1 arc, 105 mtl.	3=6 H.P. ..	1=15 H.P.	165 KW. ..	..	Lg. 6; pb. lg. arc £12, mtl. £2/12/6 p.a.	Flat rate	72,000	Lighting and traction. Data to Mar. 25, 1910	433
W. (rs.)	84 arc, 58 mtl.	..	42=798 H.P.	4,882 KW.	824 KW.	Lg. 6 & 2, or 4 (ch. 3½); pb. lg. £620 p.a.; pr. 2 & 1; tr. 1½. No mtr. rent	Max. dem., flat w. dis., pr. sl. scale†	3,187,379	Lighting and traction. *230 volts 1-ph., 380 v. 3-ph.; tr. 500 v. D.C. †Also special terms. Data to Mar. 31, 1912	434
W.	18arc, 2170cn.,* 100mtl. (apprx)	110=420 H.P.	..	1,799 KW.	..	Lg. 7 & 3, or 5; pb. lg. 3; pr. 2 to 1	Max. dem., flat, sl. scale & 2-rate w.t.sw.	958,000 (estd.)	*Total equivalent 32-watt lamps. Data to Mar. 31, 1909	435
W.	..	823 KW. ..	..	1,432 KW.	200 KW.	Lg. 3½ to 2½; pr. 1½ to ¾ ..	Max. demand, flat rate & 2-rate meter	854,900	Mond gas power station. Data to March 31, 1912 ..	436
W.	231 inc., 6 Nernst	21=150 H.P.	..	483 KW.	..	Lg. 4½; pb. lg. 2½; pr. 2½ & 3½ (2-rate, 1 & 3)	Flat rate with dis.	183,000	Data to Dec. 31, 1911	437
W.	81 arc, 160 mtl.	211=2,230 H.P.	30=900 H.P.	3,300 KW.	456 KW.	Lg. 4½ & 1½, or 3½; pb. lg. 0.85*; pr. 1½ to 0.5; tr. 2 to 1	Max. dem., flat rate, sl. sc., & cont. w. dis.	2,954,437	Lg. & tr. *Pb. lg. £15 p.a., 2 arcs to 11 p.m., 50-C.P. to dawn; 32s., 2 25-C.P. mtl. 11 to dn. Data to Mar. 31 1912	438
W.	362arc, 233mtl.	999=7,763 KW.	3,780 KW. ..	15,761 KW.	..	Lg. 3 less dis.; pb. lg. 1.5; pr. 1 less dis.; tr. 0.95	Flat rate, with dis., contract, special	19,156,999	*Lighting and traction; also 100 to 6,000 v. A.C., & tr. 500 D.C. Data to Mar. 31, 1910	439
W.	324 mtl. ..	246=2,089 H.P	..	3,854 KW.	62 KW.	Lg. 4 & 3, or 6 & 2 m.d.; pb. lg. 1; pr. 2 to ⅔; ckg. 1	Max. dem. & flat rate; pr. sl. scale	2,197,122	Data to Mar. 31, 1912	440
W.	..	24=198 H.P.	24=480 H.P.	1,483 KW.	85 KW.	Lg. 7 & 2, or 5; pr. 4½ & 1½, or 2½; tr. 2	Flat rate and contract with dis.	472,024	Lighting and traction. Data to Dec. 31, 1911	441
W.	70 (ave. 87 watts) mtl.	65=162 H.P.	..	2,182 KW.	140 KW.	Lg. 7 & 3, or 5½ (slot m., 7 incl.); pr. 4 & 1½, or 2½	Max. dem., cont., fl. rate & prepayment	564,670	*Weybridge, †Walton. Energy transmitted to Walton at 2,500 v. D.C. Data to Dec. 31, 1911	442
W.	48 arc, 22 N., 680 mtl.*	62=268 KW. (Htg. 58 KW.)	..	1,243 KW.	148 KW.	Lg. 5, pr. 2½, w. dis.; pb. lg. arc £15½, inc. £4, per post p.a.*	Flat rate with discounts	523,667	*Two cbn. lamps on arc posts; 340 posts with 2 or 4 mtl. lamps=380 lamps. Data to Mar. 31, 1912	443
W.	31 arc, 100cbn. 240 mtl.	339 H.P.	..	585 KW.	..	Lg. 4½, or £15 per KW. & 1d. p.u.; pr. 2, 1½ & 1 or £5 p. KW. & 1d.*	Max. dem., flat rate, 2-rate & cont.	255,000	*Pb. lg. 3; hg £1 & 1d. Data to Mar. 31, 1910	444
W.	..	1=6½ H.P.	..	94 KW.	..	Lg. 8; pr. 2, 3 & 4	Flat rate and contract with dis.	27,220	Connections increased, but demand reduced owing to mtl. filament lamps. Data to Dec. 31, 1909	445
W.	571 mtl.*	44=235 H.P.	..	759 KW	47 KW.	Lg. 4½†; pb. lg. 4; pr. 2 to 1, or 4½ & 1½ to 1 by 2-rate meter	Hopkinson, flat rate sl. scale & 2-rate	391,548	*9 4-lt. Osram lanterns. †Or £3 per an. per KW. & 2d. per unit. Data to Mar. 31, 1912	446
W.	54 arc, 586 mtl.	294=2,379 H.P.	133=1,480 H.P.	6,582 KW.	395 KW.	Lg. 5, 4, 3; pb. lg. 3; pr. 1 & ⅔; htg. 2; tr. 1½	Flat rate with discounts	4,001,187	Lighting and traction. Data to Mar. 31, 19 2	447
W.	212 arc, 230 cbn., 19 mtl.	221=984 H.P.	..	3,623 KW.	..	Lg. 8 & 1, or 5; pb. lg. arc £13 4s., mtl. £3 6s.; pr. 1½ to 0.58	Max. demand & flat rate	2,308,320	Bulk supply from North Met. E. P. S. Co. Data to Mar. 31, 1910	448
KW.	89 arc, 1,141 mtl.	157=1,040½ H.P.	..	7,900 KW.	580 KW.	Lg. 4½ to 3½; pb. lg. 2½; pr. 1 (above 2 H.P., 1⅔)†	Flat rate & sliding scale	2,343,289	*Merton, 1908; Ma'dens & Coombe, 1911. †Maldens, lg. 6; pr. 2. Mtrs of 363 B.H.P. pumping sewage. Data to 31/3/12	449
KW.	..	89=165 H.P.	..	1,530 KW.	78 KW.	Lg. 7, 4, & 2; pr. 4 & 1½; htg. 3 & 1, or 2	Max. demand, flat rate & contract	507,528	Data to Mar. 31, 1912	450
W.	129 cbn. ..	20=30 H.P.	..	493 KW.	..	Lg. 7; pb. lg. 3; pr. 3½	Flat rate	113,427	Data to Dec. 31, 1911	451
W. & hg	Eton, 12 arc, 53×2 mtl.	76=208 H.P.	..	1,666 KW.	..	Lg. 6 w. dis.; pr. £3 p.a. per H.P. & 1d. p.u.; hg. 3 w. dis.†	Max. dem. & flat rate w. discount	550,657	*Adtn'l b'lk s'ply from Slough & Datchet Co. †Pb. lg. arc £22, £16; twin tant. £4½ p.a. Data to Dec. 31, 1911	452
W.	60 arc, 78 N., 100 c.p. mtl.	109=320 H.P.	..	820 KW.	..	Lg. 4; pb. lg. £1,000 p.a.; pr. 3 to 1	Flat rate	329,211	Data for 1911	453
W.	..	7=55 H.P.	..	250 KW.	50 KW.	Lg. 6 & 5; pr. 2½..	Flat rate	44,421	Gas power. Data to Dec. 31, 1911	454
	..	14=50 H.P.	..	1,700 KW.	..	Lg. 6½; pr. 4 & 2; htg. 2 ..	Flat rate	619,813	Bulk supply at 2,000 volts to L. & S. W. Ry. Co. Data to Dec. 31, 1908	455
KW.	62 arc, 459 mtl. 195 N.	569=3,718 H.P.	104=2,000 KW.	6,722 KW.	..	Lg. 5 & 2, or 4 & 2½; pb. lg. arc £17, inc. £2¾ p.a.; pr. 1†; tr. 1	Max. dem., flat, & contract	10,623,031	Lighting and traction. *Tr. 500 v. †Electrolytic works, ¾d. p.u. Data to Mar. 31, 1912	456
KW.	46 arc, 11 grp. & 375×2 mtl.	243=1,581 H.P	30=750 H.P.	..	466 KW.	Lg. 6½ & 3, or 4½; pb. lg. 1.5; pr. 2½ & 1 (rest. hrs. 1); tr. 2 to 1½	Max. demand, flat rate & sl. scale	1,764,017	Lighting and traction; old station water power plant only. *Traction 500 v. Data to Mar. 31, 1912	457
W.	37 arc, 212 mtl.	61=321 H.P.	..	1,007 KW.	11.5%	Lg. 4; pb. lg. arc £15, inc. £3; pr. 1½, or 4 & 1 (2-rate); htg. 1	Flat rate with dis., t. sw., spl., & 2-rate	401,428	Data to Mar. 31, 1912	458
W.	..	..	..	234 KW.	..	Lg. 5	Flat rate and con.	5,000	Suction-gas plant. Data to April 12, 1910	459
KW.	110 arc, 326 mtl.	64=235 H.P.	..	1,442 KW.	132 KW.	Lg. 7, 5, 4½, 3, 2, 1½, 1; pb. lg. 5; pr. 1½	Flat rate and 2-rate mtr., with dis., & sp.	573,382	Data to Mar. 31, 1912	460
W	45 arc, 184 mtl., 25 N.	60=231 H.P.	20=500 H.P.	1,412 KW.	65 KW.	Lg. 5, or 5 & 2½ (⅛ dis.), out. arc 3½*; pr. 2½ to 1½ (⅛ dis.); tr. 1.625 to 1.475	Flat rate & sliding scale with dis.	710,500	Lg. & tr. *Also 12½% on net ast. & 1d. p.u. 1 Pb. lg. arc £20, £15, N. £4½, inc. £3 3s. & £2½. Data to Mar. 31., '12	461
W.	189 arc, 236 mtl.	38=70 H.P...	..	..	..	Lg. 5, less 5%; pb. lg. arc, £16 p.a.; pr. 2½ A.C., 2 D.C.	Max. dem., flat rate w. dis., cont., t. sw.	1,610,554	Lighting and traction. Data to Mar. 31, 1910 . ..	462
KW.	108 arc, 124 mtl.	283=1,692 H.P.	..	3,562 KW.	188 KW.	Lg. 7 & 1½, or 4½ to 3½, ch., &c., 3; pr. 1½ to 1†; tr. 2 to 1½	Max. dem., flat, 2-rate mtr., spl. & cont.	3,610,958	Lg. and tr. *Tr. 500 v. †Pb. lg. arc (open) £17, (enc.) per pair £12 12/0; inc., £2 17s. p.a. Data to Mar. 31, 1912	463
W.	279 mtl. ..	2=3 H.P. ..	..	50 KW. ..	25 KW.	Lg. 5; pr. 3½	Flat rate	16,081	Data to May 4, 1912	464

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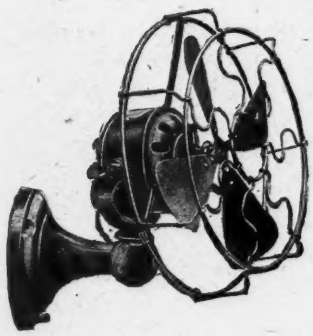

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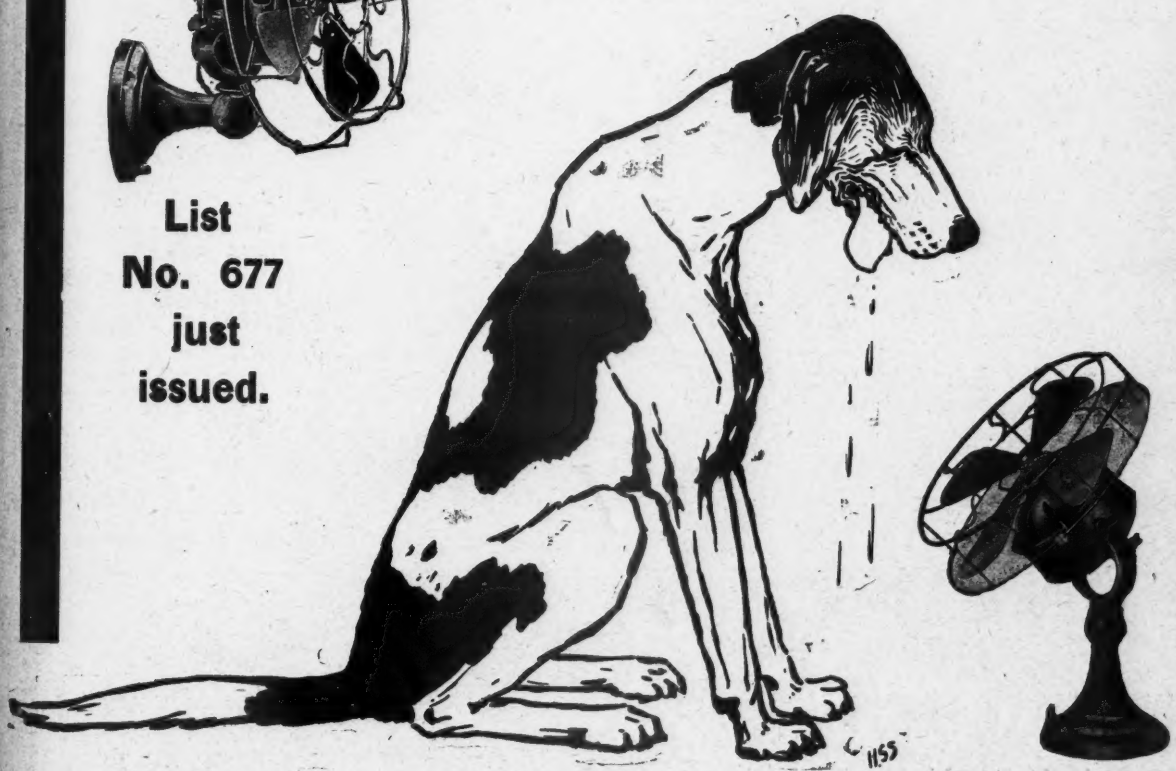

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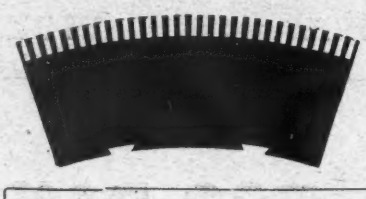

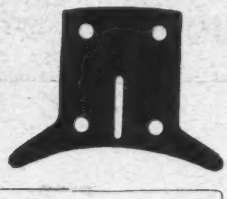

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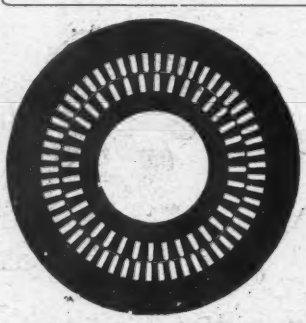

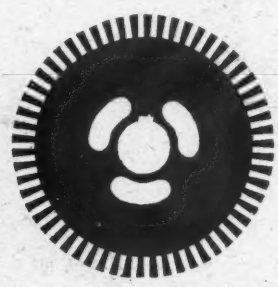

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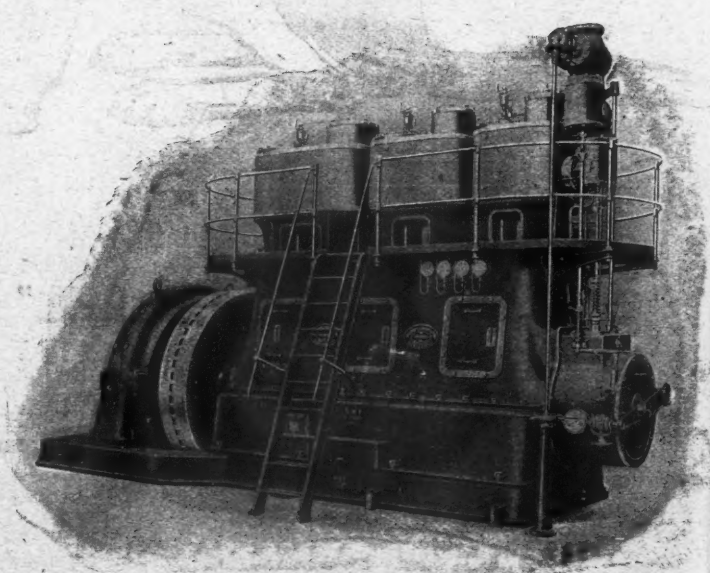

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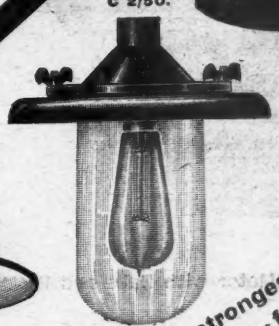

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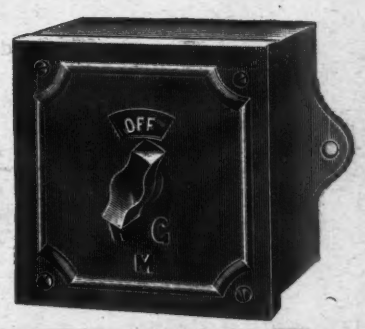

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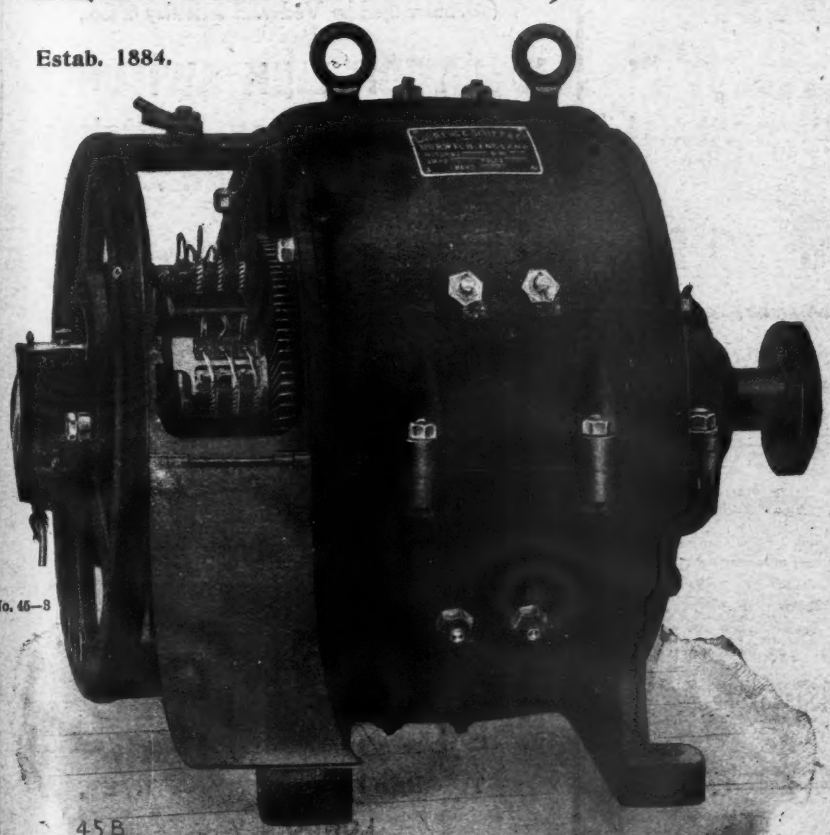

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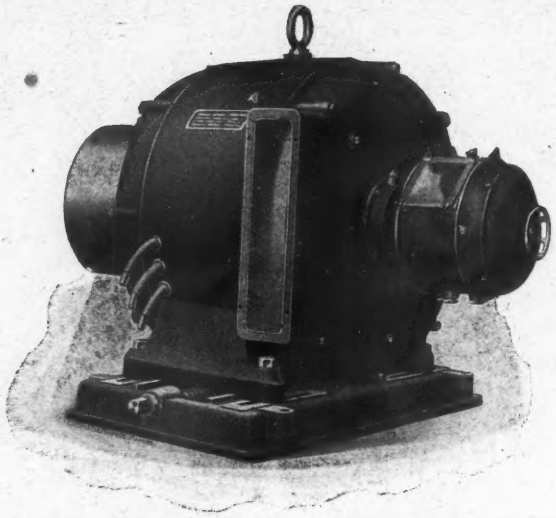

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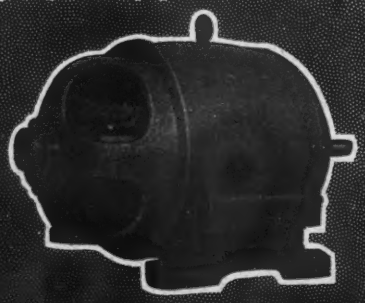

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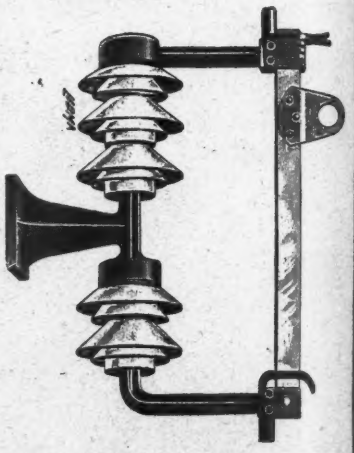

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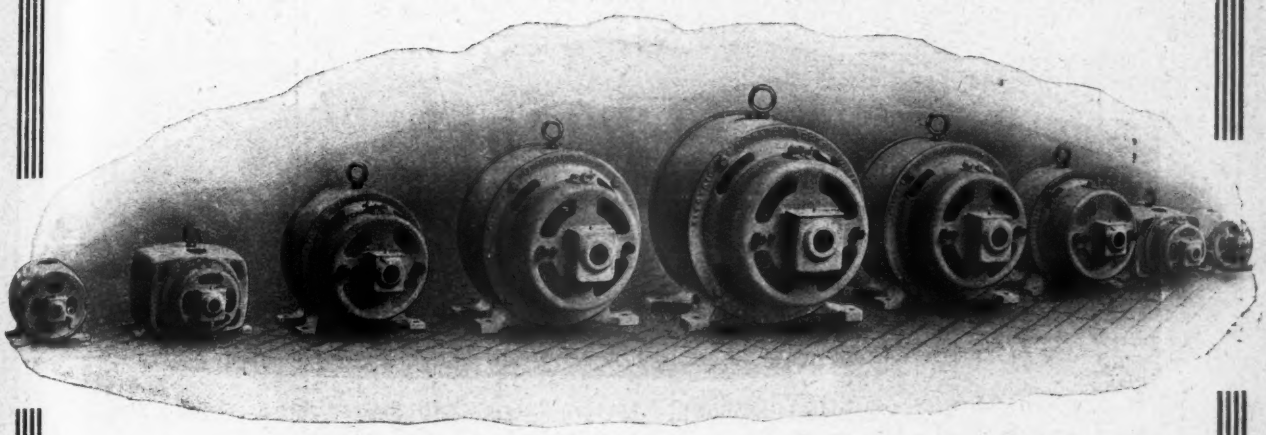

Vickers Motors are thoroughly reliable under all working conditions.

Their construction, both electrical and mechanical, is extremely substantial, rendering them specially suitable for situations where subjected to rough handling.

Their design is very simple, containing neither unnecessary features nor fragile parts likely to cause trouble.

VICKERS MOTORS ARE PERHAPS THE MOST LIBERALLY RATED MACHINES ON THE BRITISH MARKET.

Thousands of satisfied users will willingly testify that the above statement is founded on fact.

Every machine has to pass our rigid system of inspection, and carries with it our guarantee of satisfactory results.

Highly efficient and competitive in price, the Vickers Motors are to-day recognised as constituting the best investment obtainable in Electric Motors.

Write for Pamphlet entitled:—

"MODERN METHOD OF DRIVING MACHINERY."

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Electric & Ordnance Accessories

Company, Limited,

Proprietors: **VICKERS, Limited,**

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NEWCASTLE-ON-TYNE: J. W. Morley, Consett Chambers.
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PAPE ELECTRIC SAFETY LAMPS.

Patent No. 29939—1910.

Lighthouse Type 2/1404.

For use in Gas Works, Oil Tanks, Mines, Garages, Submarines, Sewers, &c.

Specification:

Dimensions—
Diameter, 2¼ in.
Height 11 in.

Weight, 5 lbs.

Capacity, 2, 1½ c.p. bulbs from 18 to 20 hours.

Price 37/6.

The PAPE MINERS' SAFETY LAMP.

Type 2/1402.

Dimensions, 10 in. by 3¾ in. diameter.

Weight, 3 lbs.

Capacity, 1½ c.p. for 12 hours.

Price 30/-

This lamp has been designed for use by the men in coal mines. The Accumulator is of a specially strong type, and has been manufactured to stand rough usage, to give long life and very low cost of maintenance. The actual capacity also is about 25 per cent. more than is claimed above, which will be found useful in emergencies.

This lamp can also be supplied in quantities on a maintenance contract at a fixed price per Lamp per week.

Write for full particulars of our maintenance agreement.

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Specification: Instout Aluminium or Gun-metal Case fitted with safety-locking and sealing devices and Bull's-eye Lens.

Specification: Weight in Aluminium, 6½ lbs.; Gun-metal, 9½ lbs. Size, 10½ in. by 5½ in. by 3 in. Capacity, 4 candle-power for about 8 to 10 hours.

Absolutely airtight.

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Write for Catalogue giving full illustrated particulars to:—

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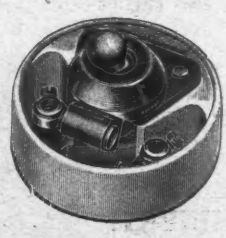
Belvedere Works, BELVEDERE, KENT.

'PHONE: 108 Erith. TELEGRAMS: Retainful, Belvedere.

More important than ever!



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ow that the cost of materials is rising so rapidly, labour-saving devices offer the only solution to the difficulty of keeping costs down. The

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for screwed steel conduit enables switches and other accessories to be fixed in the shortest possible time, and very materially reduces labour costs.

YOU SHOULD WRITE TO-DAY FOR PARTICULARS OF THE ONLY REAL IMPROVEMENT EVER MADE IN CONDUIT BOXES.

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20-WATT HIGH VOLTAGE LAMPS.

We hold large Stocks and can make immediate deliveries of above.

THE BRITISH THOMSON-HOUSTON CO., Limited,
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Works: RUGBY.
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Write to nearest Branch Office.

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an economical and convenient method of
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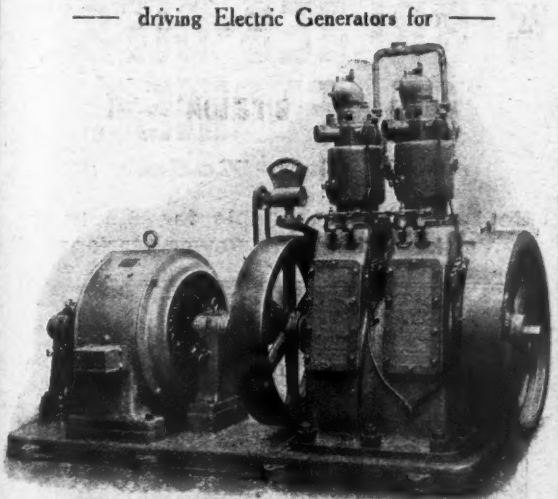

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THE CROSS OIL ENGINE
(Semi-Diesel Type),
which runs equally well on crude, residual or ordinary lamp oils; has neither vaporiser nor ignition apparatus; is self-lubricating, and can be worked by unskilled labour.

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PREPARE AND SUPPLY A CLEAN AND CAREFULLY CUT

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Sold only in 1 cwt. Bags. Prompt Delivery.
One uniform regular grade made only.

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BIOSCOPE RESISTANCES

CONSTRUCTED ON SOUND ELECTRICAL PRINCIPLES.
MICA INSULATION. NON-CORROSIVE WIRE.

ACTUAL MANUFACTURERS

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STAGE ARC LAMPS, BATTENS, FOOTLIGHTS, &c., AND GENERAL STAGE EQUIPMENT.

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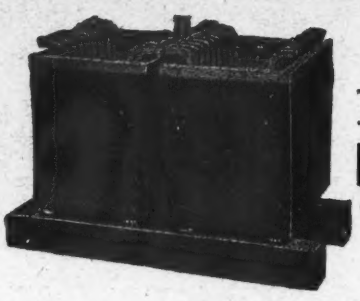
REPLATE EXISTING BATTERIES WITH PRITCHETT PLATES



because cells of any make can be replated with Pritchett Plates, and will then give a larger capacity with better efficiency.

The design and construction of Pritchett Accumulators and Plates are perfect; they are moderate in first cost, cheap to maintain, highly efficient, reliable and durable.

Every assistance is given in the erection and initial charging of batteries by expert engineers.

PRITCHETTS & GOLD, LTD.,
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Extensive experience in the — manufacture of —

High-grade

Electrical Porcelains

enables us to assure our customers of complete satisfaction in every detail:

Strength,
Insulation,
Accuracy,
Finish,
Price.

Enquiries receive personal —attention of principal.—

Quotations to models, drawings, — samples or specifications. —

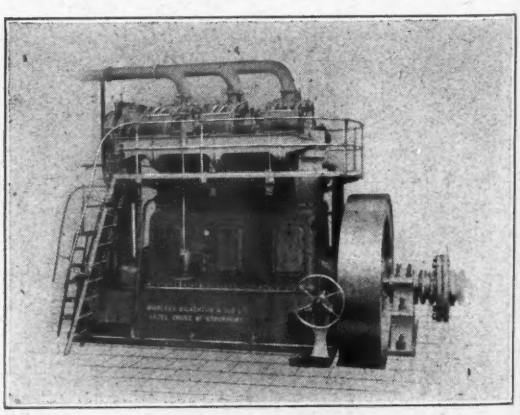
JAMES MACINTYRE & CO., LTD.,
Washington China Works,
BURSLEM, STAFFS.

POWER WITH ECONOMY.

MIRRLEES-DIESEL OIL ENGINES.

British Made.

Best and most reliable for Electricity Works and Private Power Stations.



375 B.H.P. Mirrlees-Diesel Engine.

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MIRRLEES, BICKERTON & DAY, LIMITED.
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London Office: **122, Cannon Street, E.C.**

THE THOMSON

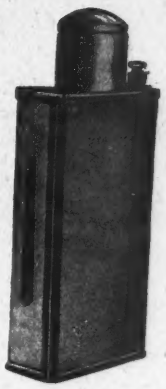
ELECTRIC LAMP

(New Type)

Required by the Meter Reader.

Price	7s. 6d. (Postage extra.)
Voltage	2 Volts
Current Consumption of Glow Lamp	0·8 Amperes
Capacity of Accumulator	2 to 2½ Amp. Hours
Hours of Light	6 to 8 Hours
Size	3¾ × 2 Inches
Weight	9 Ounces

Description.—Strong, Handsome Nickel-plated Case, with Sliding Front, fitted with Turret, Reflector, and Powerful Bull's-eye. Improved Switch, Unspillable Accumulator, and Glow Lamp, complete.



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POSSESSING EXCEPTIONAL INSULATING PROPERTIES.

Samples and Prices on application to:—

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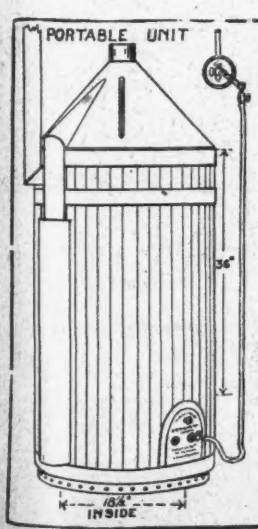

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Automatic circulation of fresh, dry, hot air (275° Fahr.).

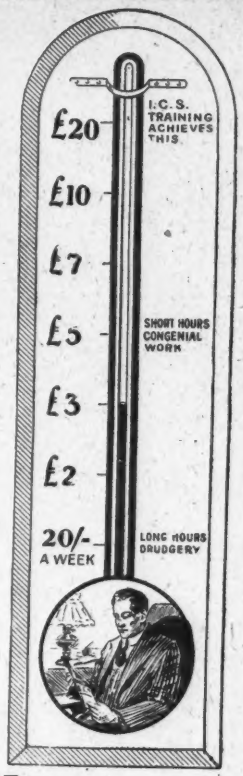
Economical gas consumption (only 6 cubic feet per hour).

Efficient drying of varnish treated coils inside of 3 hours.

Transportable, and may be connected to any gas fixture.

H. W. TURNER,

Nutsford Vale Works, Longsight, MANCHESTER.



Spare-time study sends up the wage thermometer

Because your wages are low *to-day*, they need not always be low.

Because you cannot *see* where you can get a better job, do not think there is not one for you.

If your education, when stated on paper, is reduced to the mere ability to "read and write," do not be lead-weighted by thinking *that* prevents your obtaining wage-raising knowledge.

There is still a way open to you—the I.C.S. way. The ability to read and write is all you need to begin any I.C.S. Course in practically any trade. Thousands of successful I.C.S. men have started from the same level.

Spare-time study of the unique I.C.S. text books and instruction papers *must* lead to better pay.

Even if *you* do not know the employers who pay big wages to trained men, the

International Correspondence Schools

know them, and every I.C.S. student can receive *free* assistance from the remarkable I.C.S. Students' Aid Department.

Here is an example:—

"On the Wednesday night I mentioned that I thought of taking up a course of Electric Lighting and Traction if I could get a position in an Electrical Works. On the Thursday morning you informed me that you had secured me an interview and practically a position where a very high premium is usually charged. I was engaged at a salary of about 30 per cent. more than I expected, solely due to the fact that I was taking a Course with I.C.S."

D. PRINGLE, PLYMOUTH

Whatever your present knowledge, standing, trade or whereabouts, you ought to get more facts about the I.C.S. For free particulars of any course that interests you—for information regarding the widely influential Students' Aid Department, the I.C.S. free reference books, the number of students who report increased wages week by week—and for references to students in your own district, *send this coupon NOW.*

Facts for ambitious workers

Your first I.C.S. marked Examination Paper will prove the earnest personal tuition given to every student.

Last year over 5,521 I.C.S. students reported promotion and increased wages.

This is the 21st year of the International Correspondence Schools. The oldest and greatest salary-raising institution in the world.

Thousands of workers who had only your present knowledge when they enrolled with the I.C.S. now earn double your money. Why?

The I.C.S. report students' progress to employers if desired. These reports invariably lead to Promotion and Better Pay.

"The way to Better Pay is the I.C.S. way"
—over 100,000 I.C.S. students affirm it is so.

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Dept. 239/G, International Buildings, Kingsway, London, W.C.

Please explain, without any obligation on my part, how I can qualify to enter, or to obtain a larger salary in, the occupation or profession before which I have marked X (or in the one stated here

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—Electrical Engineering	—Architecture —Advertising
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—Textile Manufacturing	*Over 180 Courses in all.*
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Name.....

Address.....

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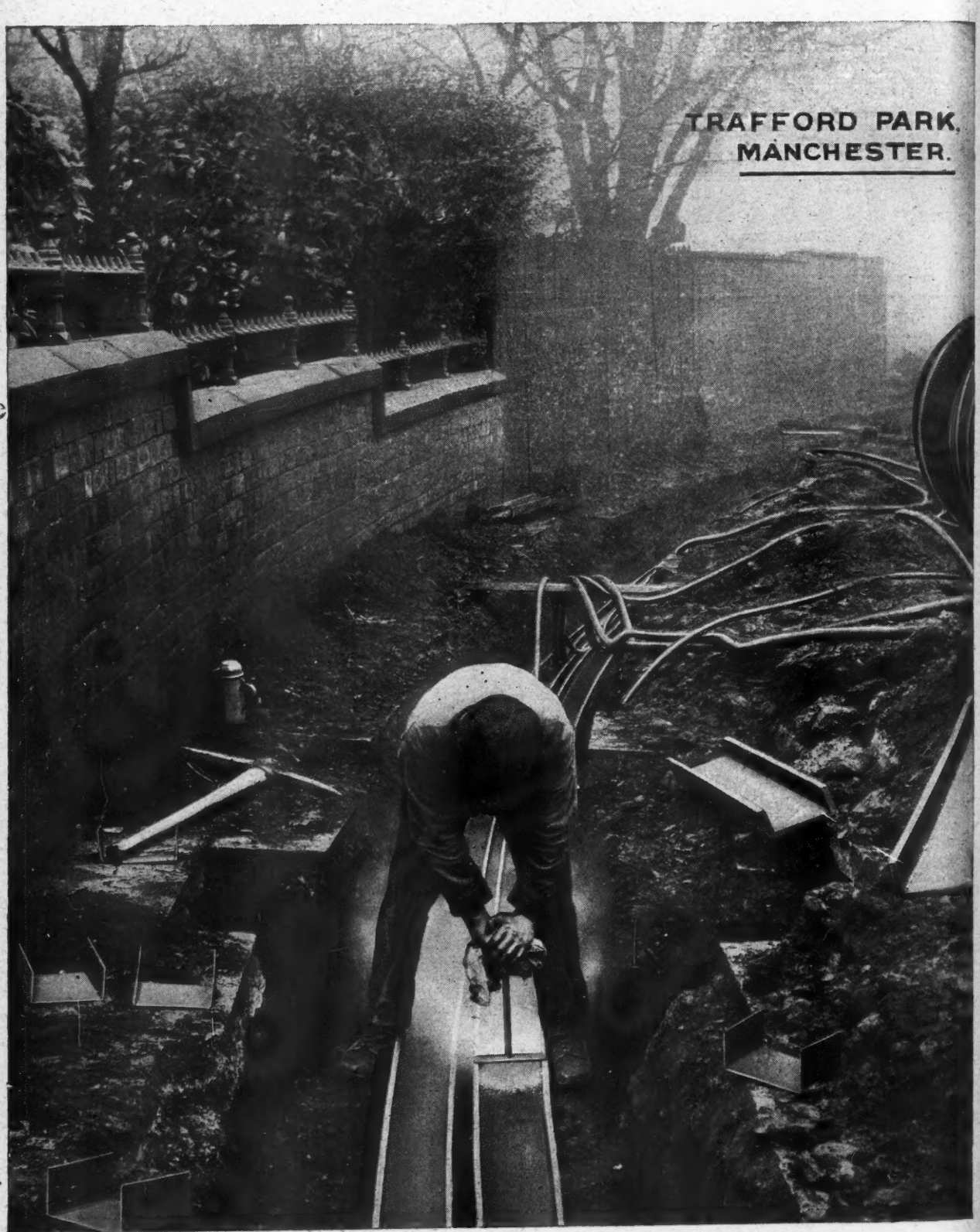

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NOW READY.

Post Free to the Trade on Application.

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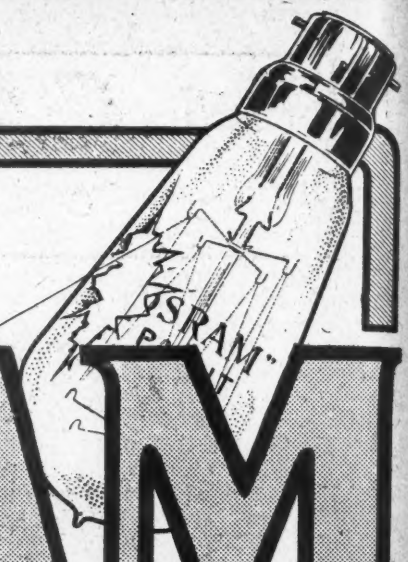
Works: DAGENHAM, ESSEX.

"A mighty strength they carry."
Shakespeare, Ant. and Clev.



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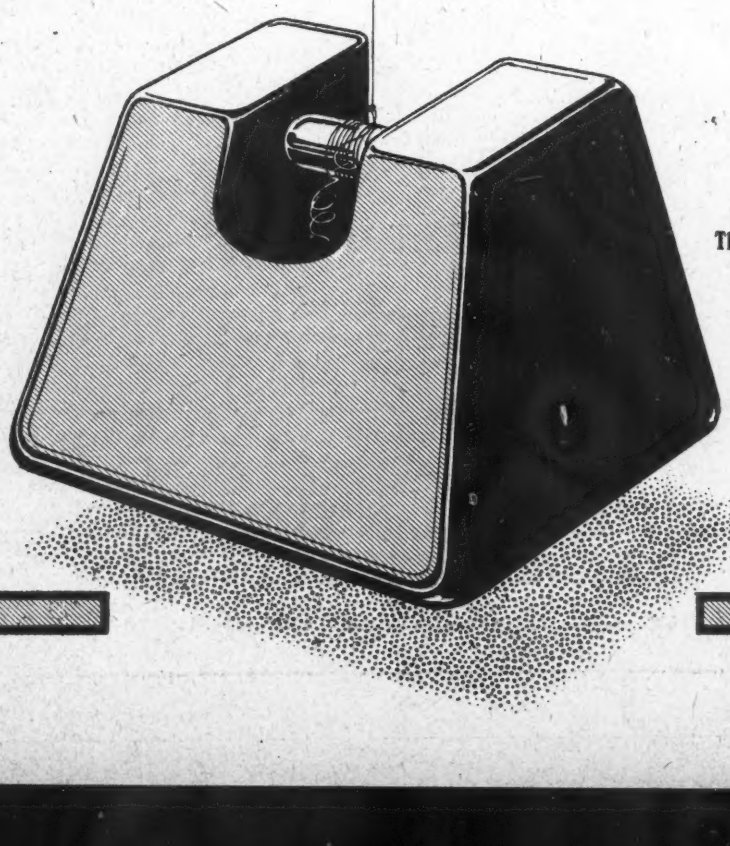
AS NOW MADE OF PURE DRAWN TUNGSTEN WIRE,

ARE POSSESSED OF REMARKABLE STRENGTH

in fact! Strength is now one of the predominant features of OSRAMS, and this without sacrifice of any of the other well-known qualities which have made OSRAMS famous throughout the entire world.

The Osram filament will easily support a considerable weight without fear of breaking, and withstands the shock of rough handling and severe vibration.

NO OTHER ELECTRIC LAMP IS STRONGER.



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Head Office:
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Latest time for receiving, 9.30 a.m. Thursday.

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LEONARD STREET, CITY ROAD.

FOR STUDENTS who are preparing to become Engineers or Chemists; and for Engineering Pupils who desire to supplement their practical training by a Two Years' Course in the Principles of Engineering Science. The instruction is mainly given in the various laboratories.

The subjects of the Entrance Examination are Mathematics and English; but the Matriculation of any British University is accepted instead.

The Courses in Mechanical and Electrical Engineering cover a period of two years, and those in Chemistry three years. There are arrangements also for Three-Year Courses in Engineering for those who desire. Fees, £20 per annum.

PROFESSORS:

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City and Guilds of London Institute,
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ASSOCIATE Memb. Inst.C.E., Student Membership, and Post Office Engineers' examinations. Expert correspondence coaching. Many successes.—UNIVERSITY ENGINEERING COLLEGE, Secretary's Department, 3, St. Mark's Crescent, Regent's Park, London, N.W. 9655

PRIVATE Tuition.—Electrical Expert, many years' experience, can arrange for private tuition in electrical installation work, technical and commercial.—Address, 9747, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EDUCATIONAL NOTICES.—*Continued.*

THE British School of Telegraphy, Ltd.—Unprecedented success of our students, who obtained no less than 97 appointments during the first four months of this year in the Wireless Telegraph and Cable Services. The School owns two Wireless Stations (licensed by Government), one station installed by Marconi's Wireless Telegraph Co., Ltd., with their standard 1½ KW. ship's apparatus. Recognised as the best equipped and most successful school in the Kingdom. Day and evening tuition. Board-residence arranged.—For full particulars apply MANAGER, 179, Clapham Road, London, S.W. 9123

UNIVERSITY Engineering College (late of Forest Hill, S.E.).—Special offers in Correspondence Tuition in Electrical Engineering, Mechanical Engineering, Mathematics and allied subjects. Fees to suit all.—Full particulars from Secretary's Department, 3, St. Mark's Crescent, Regent's Park, London, N.W. "A British Institution conducted by British Engineers." 9654

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Original Testimonials should never be sent.

COUNTY BOROUGH OF WEST HAM.

Appointment of Electrical Engineer and Manager.

THE COUNCIL of the County Borough of West Ham invite applications for the position of Engineer and Manager of their Electricity Undertaking.

Candidates must have had considerable experience in important electricity undertakings, and have a sound knowledge of the commercial management of electricity supply. The successful candidate will be required to give the whole of his time to the conduct of the business.

The salary will be at the rate of £550 per annum, rising by annual increments of £50 to a maximum of £700.

Application Forms and any other particulars required may be obtained on application to the undersigned. Canvassing is strictly prohibited.

Applications must reach me not later than 4 p.m. on FRIDAY, 28th JUNE, 1912.

FRED. E. HILLEARY,
Town Clerk.

Town Hall,
West Ham,
14*th June*, 1912. 9711

BOROUGH OF RAWTENSTALL.

Electricity Department.

WANTED, Shift Engineer, preference given to one with mechanical training and high-tension three-phase experience. Wages 30s. per week, rising at the end of 12 months to 35s., with two further annual increments to a maximum of £2.

Applications, stating age, experience, and enclosing copies of testimonials, to be received by me not later than Wednesday next, the 3rd July, 1912.

C. L. E. STEWART, A.M.I.E.E.,
Borough Electrical Engineer.

Rawtenstall. 9885

(*Continued on next page.*)

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ALLEN West & Co., Ltd., Manufacturers of Electrical Control Gear, Brighton, require reliable Senior and Junior Draughtsmen.—Apply by letter, giving experience, age and salary required, 9801, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN old-established firm of Electrical Contractors in Yorkshire are in want of a smart representative.—Apply, giving full particulars, with salary and commission, to 9709, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSEMBLERS required for electric motor works, North London. —Apply, stating age, experience and salary required, to 9876, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT Draughtsman required, to prepare wiring plans and diagrams, get out quantities, &c., of electric light and power installations for ships.—Apply by letter, stating fully qualifications, age, and wages required, to HARLAND & WOLFF, LTD., Belfast. 9882

ASSISTANT Meter Inspector wanted. Wages 25s. per week.—Applications stating age, experience, with copies of recent testimonials, to THE CHIEF ENGINEER, Electricity Works, Watford. 9850

ASSISTANT Designer required, thoroughly experienced in alternating current work.—Apply, stating age, experience, salary required, and when at liberty, to the ELECTRIC CONSTRUCTION CO., LTD., Bushbury Works, Wolverhampton. 9844

CHIEF Draughtsman.—Electrical engineering firm, manufacturing principally motors and dynamos of all descriptions, including turbo-generators, requires Chief of the drawing office, with large experience in mechanical design, especially of high-speed machinery. —Applicants should give full particulars of training, experience, salary required, &c., to 9870, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN required, experienced in Switchgear.—Apply, in writing, stating age, experience and salary required, to the MANAGER, The Electric Construction Co., Ltd., Bushbury Works, Wolverhampton. 9883

DRAUGHTSMAN required with experience in the design of A.C. or D.C. turbo machinery. — State age, experience, salary required, and when duties can be taken up, to 9887, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMEN required, for telephone apparatus and small parts. Experienced men with technical education preferred. —Telephone Department, Siemens Bros. & Co., Woolwich. 9812

ELECTRIC Lamp Manufacturers (metal filament). — Skilled hands required in every department; good wages and constant work for smart hands.—Write Box 363, Judd's, 5, Queen Victoria Street, London, E.C. 9810

ELECTRICAL Contractors' Clerk.—Wanted, a Clerk for cost sheets and supervising stores. Hours 7 a.m. to 6 p.m. Experience as stated essential.—State full particulars and salary required; Yorkshire district. — 9869, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER (commercial) required by dynamo and motor manufacturers for Middlesbrough and district. Only those need apply who have good commercial experience.—Address by letter, stating age, wage and references, to 9846, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EXPERIENCED Draughtsman Designer for electric light accessories wanted by large manufacturers.—State full experience, age and salary, 9793, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

GOOD All-round Wiremen and Mates; wiring, conduits, lighting, telephone, bells.—9895, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

IMPROVER Testers wanted for electricity meters and small electrical apparatus; previous experience unnecessary, but applicants should have had some electrical training.—Write B.T.-H. Meter Test Dept., Coventry. 9703

JUNIOR Draughtsman required for D.C. motor switchgear. Knowledge of Admiralty practice and workshop experience a recommendation.—State age, experience and salary required, 9806, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

JUNIOR Assistant required in stockroom of large wholesale house, one with knowledge of fans, small motors, arc lamps, &c., and order books preferred.—State experience and salary required, 9906, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

JUNIOR Shift Engineer wanted immediately, H.T. A.C. and turbine experience essential; good mechanical training a recommendation. Wages 25s. a week to commence.—Apply, stating age, qualifications, &c., to the SCOTTISH CENTRAL ELECTRIC POWER CO., Falkirk. 9877

SITUATIONS VACANT.—*Continued.*

MICA Ring and Tube Moulders wanted at once, Birmingham district.—State age, wage and experience, 9689, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

POWER Station Engineer and Yard Electrical Foreman required for Shipyard, man having experience with gas producers and large gas engines preferred. Must be a good time keeper and controller of men. Only first-class men need apply.—State experience and salary, 9890, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PREMIUM Pupil.—Vacancy occurs in modern high-tension single-phase alternating current generating works; experience obtained in all departments.—Apply BOROUGH ELECTRICAL ENGINEER, Hastings. 9697

PUPIL. — Vacancy occurs in electrical manufacturing works, premium partly returnable as salary, good opportunity for intelligent youth.—Apply, 9865, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REQUIRED for South Coast town, Station Superintendent; must have had experience with Diesel engines.—State wages required and full particulars with two recent testimonials, 9658, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REQUIRED for Lancashire district, first-class Representative who has established connection with borough and electrical engineers.—Apply by letter only, stating age, salary required, when disengaged, and all furth r particulars, to the BRIMSDOWN LAMP WORKS, LTD., Kingsway House, London, W.C. 9843

SALES Manager required by supply company in South of England, about end of July for accessories business. Applicants must be energetic, thoroughly experienced and well acquainted with modern business methods and organisation. Preference will be given those well known among supply authorities.—Apply, stating age, experience and salary required, 9881, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SHOP Foreman for 20 hands (in Midlands); A.C. motors and repairs. £2 and commission.—State qualifications, &c., 9866, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SUB-Station Attendant required immediately for London. Must have had experience with Rotary Converter.—Reply, stating age, experience and salary required, with copies of two recent testimonials, to 9807, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SWITCHBOARD Attendant wanted at once. Slades Green Electric Light and Power Station (three-wire D.C.). Knowledge of battery routine, wiring and arc lamps necessary. Pay about 5d. per hour, average 56 hours weekly. State age and experience. Only those who can be seen in London without expense should apply.—R. H. BURNHAM, S.E. & C. Railway, Tonbridge. 9849

TEST Room Assistant required for assembling, suspending and calibrating electrical testing instruments, one with some theoretical electrical knowledge preferred.—Apply, stating fully experience, wages expected and age, to 9880, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TEST-ROOM Assistant required for meters and motor control gear. —Apply ELECTRICAL APPARATUS CO., Vauxhall Works, South Lambeth Road, S.W. 9836

TESTING-Room Assistant required in Cable works near London. Apply, stating age, salary expected, experience, with copies of testimonials; knowledge of logs essential.—9822, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

THE Westminster Coal Testing Laboratory are prepared to take a limited number of Pupils for instruction in fuel analysis.—1, Emery Hill Street, Westminster. 9537

TRACER.—Wanted, young Tracer, must be neat and accurate and able to trace small details. West of London.—9889, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, capable Wireman.—State age, experience, and wages required, to SAMUEL FOX & CO., LTD., Stocksbridge Works, near Sheffield. 9884

WANTED, Sub-station Attendants for H.T. D.C. motor-converter sub-station. Wages 15s. per week, 12 months' agreement. The men appointed will get three weeks of shift work, and the fourth week at power station or outdoor work. Good opportunity for gaining experience on a power system. State age and experience.—Apply the SCOTTISH CENTRAL ELECTRIC POWER CO., Falkirk. 9878

WANTED at once, smart well-educated Youth for office of City electrical firm. Preference to one with knowledge of electrical work (arc lamps). Salary 15s. to 18s. — Apply 9904, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Junior Estimating Engineer; knowledge of German essential.—Address, giving details of experience and salary required, to 9879, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED by large manufacturing firm, Assistant in order department dealing with switchboards and accessories; some experience in practical work desirable, knowledge of German a recommendation but not essential.—State age, salary expected, full details of experience, to 9909, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(Continued on next page.)

SITUATIONS VACANT.—*Continued.*

WANTED at once, Draughtsmen with experience in D.C. and A.C. machines, all sizes.—State age, experience and salary required, to 9821, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED. — Switchboard Attendant for Central Station in Scotland, not less than 18 years of age. Salary 15s. per week.—9808, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED Switchboard Attendant for Power Station, near London. Must have had good technical training. Commencing wages, 15s. per week, first six months; 20s. per week, second six months.—9820, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, for Central Station near Birmingham, Assistant Mains Superintendent, accustomed to H.T. polyphase work. Wages to start 30s.—State age and experience, 9823, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Shift Engineer for sub-station, with three-phase rotary converters. Preference will be given to applicants having experience in power station and switchboard working. Salary at the rate of £52 per annum rising to £65.—Applications, stating age, and full particulars, with copies of testimonials, to be addressed to 9848, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED by large engineering firm in the Midlands, One Draughtsman used to high-tension switchgear, and One for low-tension switchgear.—Apply 9847, ELECTRICAL REVIEW, 4, Ludgate Hil, London.

WANTED, a thoroughly competent tramways platelayer as working foreman for a Corporation Tramways in the Midlands. Must be qualified to take charge of track construction and repairs.—Apply, stating wages and full particulars, to 9569, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, for small S.P. alternating town supply station, North Ireland, middle-aged man, having served apprenticeship (mechanical or electrical), to look after evening shift and make himself generally useful, chiefly in works. Salary, 35s. to 40s. per week. Stoker, &c., kept.—9744, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, capable Draughtsman, thoroughly conversant with warship electrical installations. State age, experience (theoretical and practical), salary required, and when at liberty.—VICKERS LIMITED, Barrow-in-Furness. 9798

WANTED on Tyneside a first-class H.T. Switchboard and Iron-clad Switchgear Designer. — Apply, by letter, stating previous experience, age, and salary expected, to ENGINEER, c/o Chas. Tayler & Co.'s Advertisement Offices, 30, Fleet Street, London, E.C. 9692

WANTED at once, capable Foreman experienced in erection of overhead transmission lines, mains, distributors, and services for overhead lighting schemes, and in laying and jointing cables in connection therewith. Must be competent to correspond upon, supervise, and arrange work of this class. Apply by letter only. No application considered unless accompanied by copies only of references and statement as to age, with wages and country money wanted. Permanent work.—J. B. SAUNDERS & Co., Ltd., 91, York Street, Westminster, S.W. 9845

WANTED, for Ceylon, an energetic Engineer to extend the sale of electrical supplies, experienced in wiring and contract work and accustomed to estimating, obtaining and carrying out orders.—Apply by letter, stating age and qualifications, to THE SECRETARY, Colombo Electric Tramways and Lighting Co., Ltd., 11, St. Bene't Place, Gracechurch Street, London, E.C. 9854

WIREMAN.—Wanted first-class man used to repair work, telephones, lighting, motors, &c. Must have had workshop experience. West Riding of Yorks; wages 8½d., permanency.—9867, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WORKING Branch Manager.—Wanted, first-class wireman, used to A.C.—State full particulars; salary 35s. per week; house and rates free; district, Yorkshire.—9868, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

If letters are not to be delivered to certain firms or individuals (if known), instructions to that effect should be sent to the Manager of the ELECTRICAL REVIEW, who will do his best to carry out such instructions. Letters of applicants cannot in such cases be returned to them, nor can the names of Advertisers using a number in any way be disclosed.

APPOINTMENTS FILLED.

IMPROVER.—The Borough Electrical Engineer thanks applicants for this post, and informs them that the position has now been filled. 9818

SITUATIONS WANTED.

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A CAPABLE and Energetic Electrical Engineer (28), possessing first-class central station, mains and installation experience, desires post home or abroad. — 9544, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

A CAPABLE Young Engineer, with good technical knowledge and business ability, desires an appointment in any branch of engineering work where energy and initiative could be utilised, and where there is scope for the development of originality.—9872, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ACCUMULATOR Maker, with good connection for portable accumulators, desires a position with a good firm.—9751, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (31), electrical and mechanical engineer, requires appointment. Extensive experience of plant erection and maintenance, of mining machinery, steam, gas and oil engines, pumping plant, &c. Thoroughly successful in the control of large undertakings and staff. Highest testimonials. Life abstainer. England or abroad.—9763, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER, at present buyer and sales manager, requires similar position, or would travel in cables and lighting accessories.—9766, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER desires position as Manager, thorough practical and commercial experience contractors' work, estimating, interviewing, control of men, highest references.—9579, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (late manager eminent London contractors), seeks responsible appointment.—9897, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (26) desires berth as Assistant Manager or Supervising Engineer; technical training, workshop, drawing office, commercial, mains, power house and installation experience. Good commercial man and draughtsman; supply or contractors.—9835, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Energetic and Capable Engineer (Electrical and Mechanical), with initiative, desires change. Excellent experience erection, operation and maintenance, E.H.T. and D.C. stations, mains laying, &c.—9745, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winder desires change, thoroughly experienced; traction, repairs.—9652, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AUSTRALIAN and Indian Export Business.—Gentleman with large personal connection and experience open to accept Sales managership or travel.—9581, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

COMMERCIAL Engineer, ten years' experience, technical side electrical and mechanical engineering, and ten years' experience commercial side; has held positions chief engineer, manager, &c.; now acting as departmental manager; well acquainted with modern business methods; good organiser, energetic, plenty of initiative; knowledge of several languages; wishes to get in touch with company of good standing with view to responsible position of permanent character with progressive prospects.—9691, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DEPARTMENT Manager, six years' leading London company, sound knowledge cable, conduit, accessories, metal filament lamps and small motors. Good technical and forwarding experience. —9889, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN (22) desires engagement; experienced in H.T. and L.T. switchboards and switchgear.—9899, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer (30) desires position of trust and responsibility as Assistant Works Manager in cable works or Lighting and Power Superintendent on corporation; able to control men.—9750, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Storekeeper or Counterman.—Situation in either capacity required by respectable, trustworthy young man; 11 years' good reference. Cause of leaving present situation—liquidation of firm.—C. C. P., 60, Hill Street, Peckham. 9741

ELECTRICAL Engineer, practical experience in erecting generating plant and complete lighting installations. High-class work, maintenance, desires permanent work of electrical engineering nature, works electrician or control of plant.—F. HARRISON, 88, Becket Road, West Worthing. 9769

ELECTRICAL Engineer (36) with extensive experience in the installation of power and lighting plant, especially factory distribution systems, good organiser and accustomed to control a large number of men, desires a responsible position in either a technical or commercial capacity.—9770, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(Continued on next page.)

SITUATIONS WANTED.—*Continued.*

ELECTRICIAN, disengaged, lighting, motors, arcs; charge if required.—"ELECTRICIAN," 13, Dalston Lane, N.E. 9624

ELECTRICIAN Foreman or Charge Hand, extensive practical experience lighting, power; interviewing and business ability; perfect timekeeper; situation wanted, London district.—"HOLBROOK., 43, Sedgeford Road. 9773

ELECTRICIAN seeks re-engagement; 11 years' all-round experience; Stannos; good references.—166, Commercial Road, Peckham. 9753

ELECTRICIAN wants charge of country plant, engines, batteries, telephones, bells; 18 years' experience. Willing to do carpentering. Good reference.—H., 8, Home Road, Battersea, S.W. 9832

ELECTRICIAN (22), technical, practical, experience motors, lights, bells and telephones.—BRODRICK, 51, Claremont Road, Romford. 9861

ELECTRICIAN.—Power, lighting, telephones, erection, charge of plant.—H., 40, Pentire Road, Hale End, Walthamstow. 9828

ELECTRICIAN (28), total abstainer, 14 years' varied electrical experience, used to estimating; expert wireman, power and light, experienced fitter; well-up in motor car work.—9871, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN (30), experienced in lighting up small towns and running plants for same; gas or oil engines; wants situation, own repairs; could invest small sum.—9863, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIANS, two, want situations; plant, power, lighting, &c.; home or abroad.—9755, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIANS (two) want job, house wiring, plant or maintenance; any distance.—"ELECTRICE," 24, Derby Road, West Green, N. 9838

FOREMAN, experienced in the fitting of complete generating plant, mains, wiring, estimating, &c.; at present in charge of small supply with Diesel plant.—9893, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

HANDY Man (32), good scholar, seeks constant employment in country, factory or workshop; can do general fitting work, handy at the forge; would accept any kind of employment for permanency; 7d. per hour.—9543, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

IMPROVER, thorough experience light and bells, good worker.—RUMSEY, 33, Mall Road, Hammersmith. 9859

IMPROVER, four years' experience, all systems, disengaged.—E. T., 33, Chippenham Mews, Paddington. 9858

IMPROVER, lighting, power, telephones, accumulators, casing, barrel; 6½d.—ROBERTSON, 22, Greenleaf Road, Walthamstow. 9907

IMPROVER, coil winder, good knowledge armature winding, seeks post, moderate salary.—9862, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

IMPROVER, sound practical knowledge, bells, lighting, wiring, &c.—S. MARTIN, Bowbridge Road, Newark. 9699

IMPROVER-Wireman wants job; good experience in barrel, casing; own tools.—ELECTRA, 123, Inglelow Road, Battersea. 9804

JUNIOR (18½) requires situation with electrical firm. Good technical knowledge and workshop experience.—C., 32, Dawson Street, Manchester. 9802

MAN (30), married, smart, healthy, seeks any capacity, or prospects, to learn anything; good experience in order department, electric lamps, &c., Siemens; good references.—RUSSELL, 95, Wellington Road, West Hackney, N. 9864

PLUMBER-Jointer and Cable Foreman, 14 years' experience, first-class testimonials, all make of cables, home or abroad.—9833, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WIREMAN, quick and competent (all branches).—FIRMIN, 68, Inglethorpe Street, Fulham, London. 9768

WIREMAN, experienced all systems; good refs.—C. ELLIS, 32, Smith Street, Chelsea. 9830

WIREMAN, quick, competent, town, country; references.—"ELECTRICIAN," 142, Church Road, Manor Park. 9892

WIREMAN, reliable, wants job, any system; refs.—E., 11, Lamont Road, Chelsea. 9842

WIREMAN, 10 years' experience, all systems, disengaged,—H. W., 60, Marylands Road, Paddington. 9857

WIREMAN (27), used to lighting, bells or motors. Good references.—13, Lambert Street, Islington. 9873

WIREMAN (competent); good reference; town or country.—H., 53, Filmer Road, Fulham. 9860

WIREMAN wants job, casing or screw tube.—H.B., 44, Bromley Road, Walthamstow. 9898

SITUATIONS WANTED.—*Continued.*

WIREMAN, thoroughly competent, reliable, any capacity.—G., 180, High Street, Plumstead. 9896

WIREMAN, lighting, bells, telephones, or jobbing-hand, seeks situation.—NICHOLSON, 40, Woodstock Road, Forest Gate. 9638

WIREMAN, 14 years' experience, disengaged, all branches.—H., 27, Bendemeer Road, Putney. 9622

WIREMAN'S Assistant, three years' experience, seeks situation. B. P., 55, Borwick Avenue, Walthamstow. 9648

WIREMAN (25) desires Situation; casing, screwed tube, Stannos.—SHOTTER, 4, Byrne Road, Balham. 9635

WIREMAN disengaged, all systems.—R., 27, Lysia Street, Fulham. 9644

WORKING-Foreman or otherwise, well recommended; 12 years' late firm, West-End, all systems; good worker, wants change.—A.C., 11, Wordsworth Avenue, Manor Park, Essex. 9749

YOUNG man seeks situation in drawing office or testing room with manufacturing electrical engineers; technical knowledge.—9645, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PARTNERSHIPS.

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ELECTRICAL Engineer, owning good going Picture Palace, desires young active Partner, with £600 capital, to start similar place in another district.—9695, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ESTABLISHED Engineering Firm, showing excellent prospects and of substantial standing requires additional capital for extension of business, and are open to take into partnership Constructional Draughtsman. Works situated near London.—Apply SECRETARY, S. Cronk & Co., Lombard Street, E.C. 9587

PARTNER wanted, for provincial manufacturing and factoring business. Good opportunity for right man, who must be practical and energetic; only moderate capital required.—9776, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PARTNER or Active Director required with £5000 in an old-established Electrical and Mechanical Engineering Works, Southern County, manufacturing specialities in increasing demand, present turnover over £30,000 p.a., open to closest investigation.—Particulars from MESSRS. ARNOLD & CO., 76, Cannon Street, London, E.C. 9903

£2000 Active Director required in London Engineering Works manufacturing special machinery, with £10,000 worth of profitable contracts in hand, a good return offered with debenture security.—Particulars from MESSRS. ARNOLD & CO., 76, Cannon Street, London, E.C. 9902

AGENCIES.

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AGENTS wanted in several of the principal towns of England, Scotland and Ireland, for the sale of vulcanized rubber, insulated electric wires and cables.—Apply SAMUEL HARTFORD AND CO., LTD., Oldham Place, Liverpool. 9809

COMMERCIAL Engineer, with live connection in London and district (shippers, consultants and contractors), wishes to communicate with electrical or engineering firms desiring to open up or extend business.—9908, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, with first-class West End offices, telephone and connection, wishes several Sole Agencies, London and South of England; expert oil or gas engines, electrical power transmission, lifts, superintend erection, and, if necessary, design. Small retaining fee and commission. Heavy engineering.—9855, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(Continued on next page.)

AGENCIES.—*Continued.*

LIVE Agents wanted in each county to handle high-class Electrical Specialities; exclusive territory. Liberal terms to those who can influence considerable business.—9696, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

MANUFACTURERS of pyrometers, steam meters, gauges, thermometers, &c., are open to appoint Sole Agents, various districts. Very liberal terms. Preference given to young engineers. —9814, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PATENT Agent and Engineer, with extensive experience and a sound knowledge of British and foreign patent law desires engagement with a company largely interested in patents.—9684, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REPRESENTATION in Provinces required by an old-established electrical firm (private limited) who confine themselves to the manufacture of one line of specialities of well-known and good quality. To a real live man already working ground, advertisers are prepared to deal on commission and give partnership if results reach an agreed amount within specified time. Application treated in strict confidence.—9888, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SOUTH America.—Engineer returning to Argentina and Chili in July requires Agency for small combined Oil Sets, lighting and pumping, marine motors, workshop machinery, water and wind motors.—9743, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR SALE.

FOR SALE.

NO. 3 Brown & Sharpe's Surface Grinding Machine, 36" × 14" × 11½".
Landis Cylindrical Grinding Machine, capacity 12" × 48".
Springfield Grinding Machine, 19" centres, 8' 3" between centres.
Double Geared Pillar Type Radial Drilling Machine, 6' arm, 3" spindle, balanced action, tapping motion, &c.
Rack Driven Planing Machine, to plain 6' × 2' 6" × 2' 6".
Motor Driven Side Planing Machine (by Richards) bed 6' long.
5' 6" Swing Triple Geared Surfacing Lathe by Dean Smith & Grace.
Double Geared Universal Brass Finisher's Lathe (by Davis and Egan) 7½" centres, 6' bed.
Wire Fed Turret Lathe, 1⅜" hollow spindle.
Lincoln Type Milling Machine, table 2' 3" × 9".

CATALOGUE of Stock MACHINERY. 2-3,000 LOTS, free on application. Inspection invited.

THOS. W. WARD, LTD., ALBION WORKS, Tel.: "Forward, "Sheffield." SHEFFIELD.

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A Testing Set, by Evershed's, excellent condition, cheap.—9627, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ACCUMULATORS in celluloid cases, 4 volt 60 amp.; 17s. 6d. each, on approval.—Write for particulars of special offer, A. COLLIS, 64, Liverpool Road, Birkdale. 9203

ARC Lamps, 18 enclosed type, 200 v. D.C., all in good working condition; must be sold. What offers?—ELECTRICIAN, 168, Katherine Road, East Ham. 9628

BARGAIN, Electric Light Plant, costing £500, 9-H.P. National Engine, 140 volt 30 amp. Dynamo, marble Switchboard, Three Meters, Accumulator, Cut-out, all Switches and Selectors, Belt, 52 Cells, Trays, sundries; practically new; what offers?—EDWIN LEE, 111, Union Street, Torquay. 9767

CABLE Casings to compete against any manufacturers in the World. Trade discounts on application. Creosoted troughing and timber for underground work, also woodwork of all descriptions for home or export.—JENNINGS' CO., Timber Merchants, General Woodworkers, 991, Pennywell Road, Bristol. 9508

DYNAMOS, 3000, 1500, 1000 and 750 amperes at 6 volts, ready for delivery; also smaller sizes delivered from stock. Machines let out on hire. — CANNING & CO., Electro-Platers' Engineers, Birmingham.

DYNAMO, 250-volt, 60-amp., with slide rails. Motor, two-phase 10 H.P. 200 volts.—SQUIRE, Other Road, Redditch. 9894

FOR SALE.—*Continued.*

E.C.C. Dynamo, 105 v. 280 a., compound, £80.—MARTIN, 320, Witton Road, Birmingham. 9583

ELECTRIC Cable, Motors, Dynamos, Carbon Filament Lamps, Search Light Projectors, Flexible, Belting, Accessories, &c., very cheap.—LAKE, 132, Upper Thames Street, London, E.C. 9614

ELECTRIC Motors, largest stock in London, sale or hire. All tested and in sound working order. All sizes and voltages. —ELECTROPLANT CO., 28, Gray's Inn Road, W.C. Telephone No: 1280 Holborn. 9841

FOR Sale, the plant mentioned below, which has been running up to the present moment, and is being removed to allow for extensions:— One high-class Browett-Lindley Horizontal Compound Engine, 100 H.P., 180 revs., with special lubricators for long runs. Fly Rope Wheel, 7 ft. dia., with 10 grooves for 1" dia. rope. Two Mather & Platt Alternators, with exciters, driven by above engine, 2500 volts, 50 periods, 75 kilowatts each. One direct-coupled Willans Engine (2 Fs.) and Mather & Platt four-pole shunt wound Dynamo, 220 volts, 160 amps. One direct-coupled Willans Engine (3 Gs.) and Mather & Platt four-pole shunt-wound Dynamo, 220 volts, 275 amps.—Apply 9666, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR Sale or Hire, high-class Dynamos, Motors, Alternators, Cable and Arc Lamps.—PERCY HUDDLESTON & CO., 72, Finsbury Pavement, E.C. 9118

FOR Sale, 500-KW., 500-volt D.C. Generating Set, Peache Engine, E.C.C. Dynamo. Low price for prompt sale. — ENGINEER, Electricity Works, Wolverhampton. 6037

FOR Sale.—Four 30-KW. Compound Steam Generating Sets, by Brush Electric Co., 100 volts.—Particulars, HARRY H. GARDAM, Staines. 9346

FOR Sale, Dynamo in good condition, very little used, 6 volts 1500 amps., speed 940 R.P.M.; offer wanted.—Address 9726, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR Sale Cheap.—50 B.T.-H. 3-phase Motors, also several D.C., various sizes. Cancelled contract. State requirements.—WINDER, Cross Belgrave Street, Leeds. 9778

FOR Sale, one 150-KW. compound belt-driven Generator, 400 volts, speed 450 revs., modern, new condition, or as motors about 200 B.H.P.—WINDER, Cross Belgrave Street, Leeds. 9813

FOR Sale.—Well-made Accumulator Switchboard, about 3 ft. 4 in. × 4 ft. 5 in., 160 volts 70 amps.; charge and discharge switch, two ammeters, one voltmeter, four circuits, three panels, teak frame; condition as new.—E. PAMINGTON, 16, Clerkenwell Green, E.C. 9805

FOR Sale, 12 Meridian Arc Lamps, outside pattern, with hood reflectors, in good condition, with resistances for 2 in series on 220 volts, for disposal. The lamps can be seen burning, if required. No reasonable offer refused.—Apply, MANN, EGERTON AND CO., LTD., 5, Bank Plain, Norwich. 9875

FOUR Dry-Back Marine Type Boilers by Fraser's; 11 ft. 2 in. diameter by 13 ft. long. Suitable for 180 lbs. steam, 1000 gallons evaporated per hour each. Heating surface 2000 sq. ft. Will be sold cheap before removal; seen London.—Apply HARRY H. GARDAM, Staines. 9350

GENERATING Set, 90-KW., Crompton two-pole Compound Machine, 430 amps. 210 volts, 400 revs., four-cylinder Engine by Alley & McLellan. Cheap before removal.—SMITH, Ross Works, Bradford. 9693

I.T.E. Circuit Breakers from 4 amperes upwards. Large stock in London.—Enquiries, I.T.E. ELECTRIC CO. (1907), LTD., 72, Finsbury Pavement, London. 9545

MANUAL of Wireless Telegraphy, by Commander S. S. Robinson, U.S.N. The best Text-book for Marconi students. Recommended and used by the leading teachers. Cloth 8vo, 212 pp., illustrated, 7s. 6d. net, or 7s. 10d. post free, from S. RENTELL & CO., LTD., 36, Maiden Lane, Strand, London. 9677

MORLEY Dynamo, 310 a. 200/220 v., 700 R.P.M., 4-pole, 3-bearing.—MARTIN, 320, Witton Road, Birmingham. 9584

MOTOR Drill or Motor, 100 v. 3 amps., D.C., £3; 6" spark Induction Coil, £5.—RORKE & SONS, Britannia Garage, Britannia Road, Walham Green. 9837

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(Continued on next page.

FOR SALE.—*Continued.*

TO save cost of removal before July 13th, MESSRS. R. H. LONGBOTHAM & Co., LTD., Wakefield, have recently purchased a Plant lying near London, consisting roughly of two locomotive-type Boilers, by Davey, Paxman & Co., and one Peache Engine coupled direct to dynamo, also one small Dynamo (dynamos by the Electric Construction Co.), Sturtevant Blower, Heater, Switchboard and two small Pumps. Will dispose on exceptional terms. Specifications can be had on application. Telegrams: Engineer, Wakefield. Telephone: 44 Wakefield. 9675

TWO Bergmann Dynamos, 155 a. 200/230 v., 4-pole compound wound. B.T.-H. Dynamo, 455 a., 110 v., 6-pole.—MARTIN, 320, Witton Road, Birmingham. 9585

TWO 30-KW. Dynamos, 200 volts. Modern machines done very little work.—Particulars, HARRY H. GARDAM, Staines. 9348

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120-KW., three-bearing type, belt-driven, A.E.G. Dynamo, 500 volts D.C., or 150-H.P. motor, 500 revs.—THE LUMSDEN MACHINE CO., Gateshead. 9414

10,000 Carbon Filament Lamps, guaranteed standard quality. 1½d. each low voltage, 2½d. high voltage; cash with order.—GABRIEL LAMP CO., 15, Victoria Street, London, S.W. 9803

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State whether condensing plant included, giving price, full particulars, where running and when available.
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ACCUMULATORS, Second-hand, any type, wanted; also Dynamos and Machinery, Lead Peroxide, Old Copper Cable, Scrap Metals, and every description of Metallic Dross purchased for cash, town or country.—Write A. BROWN & SONS, 142, Lower Clapton Road, N.E. Telephone: Dalston 555. 9829

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WANTED, Motor 10-15 H.P., 430 volts, D.C., also starting gear. Cheap for cash.—Reply 9856, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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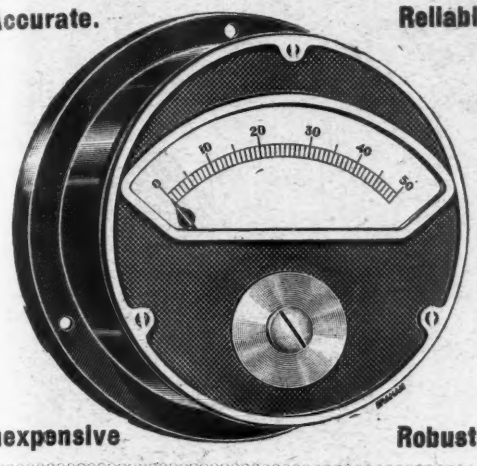

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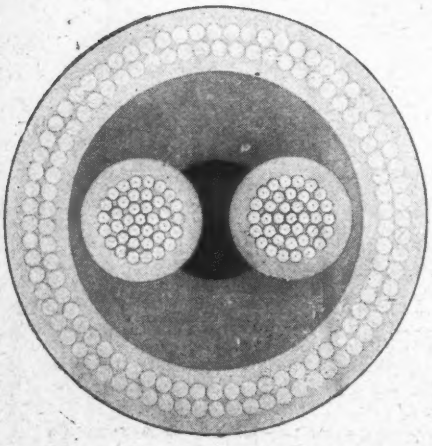

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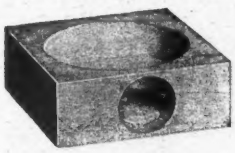

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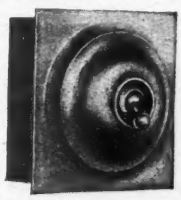

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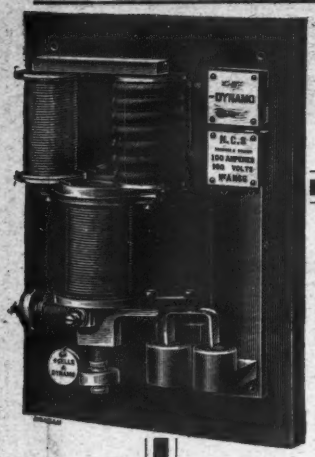

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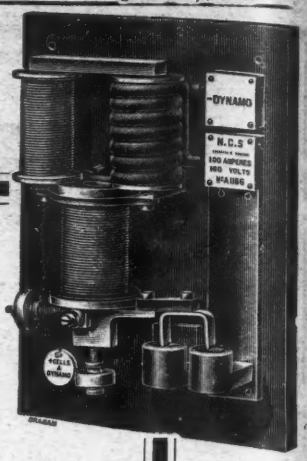

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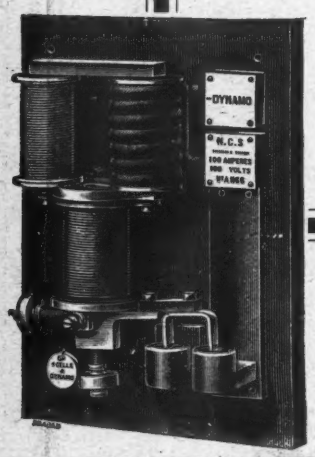

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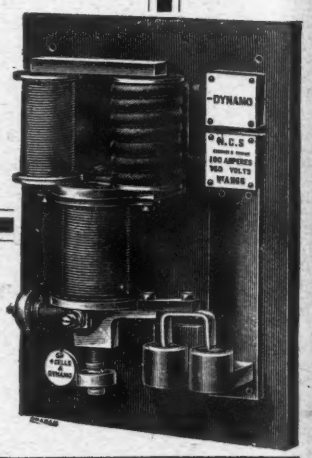

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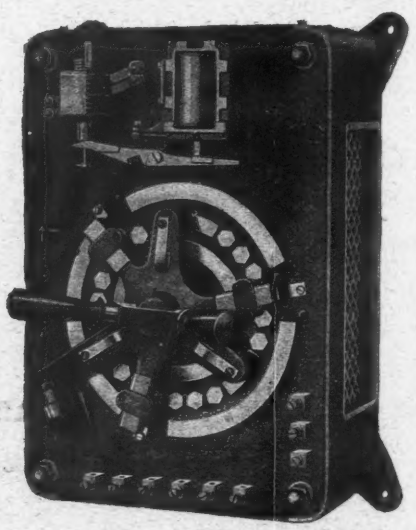

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REMOVAL.
Mr. J. G. LORRAIN, M.I.E.E., M.I.Mech.E., Chartered Patent Agent, has removed his office from Norfolk House, Norfolk Street, Strand, London, W.C., to Staple Inn Buildings, High Holborn, London, W.C.

THE Proprietor of British Patent No. 18,322 of 1904, for a System of Electric Lighting for Railway Trains, is desirous of entering into arrangements with British Manufacturers with a view to the sale or commercial exploitation of the invention protected by the above Letters Patent.
Interested parties are invited to communicate with the undersigned for further particulars.
HENRY SKERRETT,
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OFFICIAL NOTICES.

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ARON ELECTRICITY METER.

THE FIFTEENTH ORDINARY GENERAL MEETING of the ARON ELECTRICITY METER, LIMITED, was held yesterday at Winchester House, Old Broad Street, E.C. Colonel R. E. B. CROMPTON, C.B., M.Inst.C.E., M.I.E.E., who presided, said: I have to move: "That the report and accounts as submitted to the shareholders be taken as read." I regret very much that it is necessary for me to take the Chair to-day, the cause being the illness of Mr. Hirst, who is the Chairman of this Company. It is much to be regretted, and I am afraid I can ill fill his place. Luckily, I have very little to say to you to-day. We are undoubtedly a prosperous Company; our progress has been steady from the dark days of the past up to the present days, which are so much brighter, and contain so much promise of continuing in the future, and showing the same rate of progress. You will see that during the year under review the net profits have risen from £27,520 to £30,542, which is, roughly, an increase of over 10 per cent. The rate of dividend on both classes of Shares is the same as was paid last year. That being so, we are in the fortunate position of being able to put to our Reserve Fund against goodwill and patents the sum of £10,000, in place of the £5,000 which we placed to it last year, thus raising the reserve to £40,000. Even after such a generous provision to reserve, there is still sufficient left to clear off the remainder of the expenses incurred in connection with the Debenture Issue of 1911. The special feature of the year's trading has been a severe drop in selling prices. The Board—Dr. Aron especially, whom, I am glad to say, we have here with us to-day—have made every effort to counteract this by the most severe economy in production and administration, and last, but not least, by pushing the sales of our products to the utmost possible point. That we have been successful is proved by the figures that I have read to you. Unless any shareholder wishes to ask questions I do not propose to say more, except to express the hope that we may have in front of us equally successful years, and many of them. However, I wish to take the opportunity before I sit down of thanking Prof. Aron for his unremitting efforts to improve the position of this Company. I also wish, in Mr. Hirst's absence, to add my testimony, and that of my brother Directors, to his splendid work as Chairman of the Company. I do not say that the whole of the work has been done by those two men, as all our Directors are excellent men of business, and give most unremitting attention to our concern. I think it is some little triumph for the Board, as a whole, to be able to point to the position of the Aron Company as it now stands, as compared with what it was, say, eight years ago. I now beg to move: "That the report and accounts, as submitted to the shareholders, be received and adopted."

Mr. ROGER W. WALLACE, K.C.: I have very great pleasure in seconding the motion. As I have just returned from the Continent, I should like to say that the prospects of this Company abroad continue to be everything that could be desired, and to promise in the future still greater returns, especially in Austria, where the work is going on in a wonderfully successful manner. It appears that the use of electricity and the supply of our commodities have not yet reached the great expansion that we expect in the future. The name of Dr. Aron is a tower of strength to this Company. The personal element in this Company contributes very largely to the enormous sale of meters throughout the Continent. Dr. Aron is not so well known here, but he is getting better known day by day, and I hope that the sales of our commodities in this country will soon equal those that we have abroad. Fortunately, it is not necessary for me to say much, because results show how the Company has been progressing.

Mr. WIMP: I see that the balance of profit available for dividend on the Ordinary shares amounts to 18 per cent., including the amount carried to reserve and the writing off of the cost of the Debenture Issue last year. Of course, it is sound finance to clear the Debenture Issue expenses out of the way; but when we look back and see that the Preference shareholders have always had their pound of flesh and that the arrears of commission and Directors' fees have been paid—very rightly, because the way in which the board has pulled this company round is simply marvellous—I would ask you whether the board will not take into account, next year at any rate, the claims of the Ordinary shareholders. I understand that the Preference shareholders have had their 6 per cent. up-to date for 15 years, and as soon as we have received 8 per cent. I understand that the Preference shareholders come in again.

The CHAIRMAN: Ten per cent.

Mr. WIMP: Then, in the future, as soon as we have received 10 per cent., the Preference shareholders come in again. You have built up a fine Reserve fund, and you are making a fine profit. If we are going to show 18 per cent. available after the Preference dividend has been paid next year, cannot you promise us a rather larger dividend? I do not say this in any captious spirit, but I do think that the Ordinary shareholders may look upon it that their arrears of dividend, so to speak, being non-cumulative, have been lost sight of. Therefore, do you not think that in the future, if the company still shows its present rate of progress, you will be able to do something better for us?

The CHAIRMAN: Well, I think the conservative policy is the best. I think you will agree that we want to put this company in an unassailable position by building up our reserve. Like yourself, I am a considerable Ordinary shareholder, and we should all like to have dividends now; but I think it is preferable to have our property increasing in value, which will be reflected, I may say, in the price of the Ordinary shares in the market. I am convinced that that will be the result if the Directors continue on the conservative lines we are going on now. I think that is the best answer I can make as a business man. It is really Mr. Hirst's business to do this; but I heartily concur with him in the conservative policy I have indicated.

The CHAIRMAN then moved: "That a dividend of 3 per cent. on the Preference shares of the company for the six months ended March 31st, 1912, and 6 per cent. on the Ordinary shares for the 12 months ended on the same date, as recommended by the directors, be paid."

A vote of thanks to the CHAIRMAN terminated the proceedings.

(*Continued on page 25.*)

THE

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THE SIGN

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LONDON OFFICE: 39, VICTORIA STREET.

OFFICIAL NOTICES.—*Continued from page* 23.

DUNDALK URBAN DISTRICT COUNCIL.

ELECTRICITY DEPARTMENT.

Contract for Stores.

THE DUNDALK URBAN DISTRICT COUNCIL will, at their meeting to be held on TUESDAY, the 9th JULY, 1912, consider Tenders for the supplying of material under the following headings, from the 9th July, 1912, to 31st March, 1913, at such times and in such quantities as they may from time to time direct, to be delivered carriage free at the stores at the Electricity Works, Dundalk:—

Engine Room Stores.
Cables and Wires.
Cable Accessories.
Incandescent Lamps.
Lighting Accessories.

Lists and Forms of Tenders may be had on receipt of stamped addressed envelope (foolscap), on application to the Town Clerk.

Sealed Tenders, addressed to the Chairman of the Urban District Council, must be delivered at the Town Clerk's office not later than 8th JULY.

The lowest or any Tender not necessarily accepted.

By order,
MATHEW COMERFORD,
Town Clerk.

Town Hall,
Dundalk. 9816

URBAN DISTRICT COUNCIL OF BRIDGEND, GLAMORGAN.

ELECTRICITY WORKS EXTENSIONS.

325-Kilowatt Steam Engine, Alternator and Accessories.

THE URBAN DISTRICT COUNCIL OF BRIDGEND are prepared to receive Tenders for the Supply and erection of the above, subject to the Local Government Board's sanction being obtained to the necessary loan.

Copies of the Specification may be obtained from the undersigned on receipt of One Guinea (£1 1s.), which sum will be returned on receipt of a *bona fide* tender.

Tenders will only be considered for complete sections, and not for part of sections.

The Council do not bind themselves to accept the lowest or any tender.

Tenders to be addressed to the Council's Clerk, Bridgend, Glam., and must be received by him on or before TUESDAY, JULY 9th, sealed and endorsed "Tender for Electricity Works."

W. WELBURY,
Engineer and Manager. 9827

CITY OF CHICHESTER.

THE DIRECTORS of the Chichester Electric Light and Power Company are prepared to receive Tenders for Cables. Specifications and particulars can be obtained from the Consulting Engineers, Messrs HORACE BOOT & PARTNERS, Westminster Chambers, 7, Victoria Street, S.W. 9817

OFFICIAL NOTICES.—*Continued.*

COMMONWEALTH OF AUSTRALIA.

Postmaster-General's Department,
22*nd May*, 1912.

TENDERS are invited for the Supply and Delivery of Material as follows:—

Material required.	Where required.	Date on which Tenders are returnable.
Telephone Switchboards at Unley, as per Stores Schedules Nos. 225 and 226	Adelaide	1st October, 1912.
Common Battery and Automatic Switchboards at Newtown, Glebe and Balmain, N.S.W., as per Stores Schedules Nos. 128, 122, 131, 151, 153 and 154 ...	Sydney	28th August, 1912.
Telephone Switchboards at Norwood, as per Stores Schedules Nos. 223 and 224.	Adelaide	1st October, 1912.
Telephone Switchboard at Port Adelaide	,,	22nd October, 1912.
Switchboard, 14 sections, Common Battery Multiple	Melbourne	,,

Tender Forms, Specifications, &c., may be obtained, and Sealed Patterns inspected at the Commonwealth Office, 72, Victoria Street, London, S.W.

C. E. FRAZER,
Postmaster-General. 9900

ELECTRIC LIGHTING, &c.

THE GUARDIANS of the Salford Union are prepared to receive tenders for Electric Light, Telephone and Fire Alarm Installations at the Union Infirmary, Hope, Pendleton.

Copies of the Specification, with Forms of Tender, General Conditions and Quantities, may be obtained on application to the Clerk to the Guardians, Union Offices, Salford, or to the Consulting Engineer, Mr. E. M. LACEY, M.I.C.E., 78, King Street, Manchester, on payment of a fee of £3 3s., which will be returned on receipt of a *bona fide* tender. Extra copies may be obtained for a charge of 10s., not returnable.

Tenders must be delivered to the undersigned not later than THURSDAY, 25th JULY, 1912.

Drawings may be inspected at the Offices of the Consulting Engineer, Mr. E. M. LACEY, Iddesleigh Mansions, Westminster, and 78, King Street, Manchester, or at the Offices of the Clerk to the Guardians.

The Board of Guardians do not bind themselves to accept the lowest or any tender, and reserve to themselves the right of accepting the whole or any portion of a tender.

By Order,
F. TOWNSON,
Clerk to the Guardians.

Union Offices, Eccles New Road,
Salford, 28*th June*, 1912. 9891

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Full Prospectuses and Forms of Application may be obtained from the offices of the Company, 4, Queen Victoria Street, E.C., or from the Bankers, Lloyd's Bank, Ltd., 71, Lombard Street, E.C., and Branches, and The Royal Bank of Canada, 2, Bank Buildings, Princes Street, E.C.

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,, VII.—Protection and Installation of a Station.
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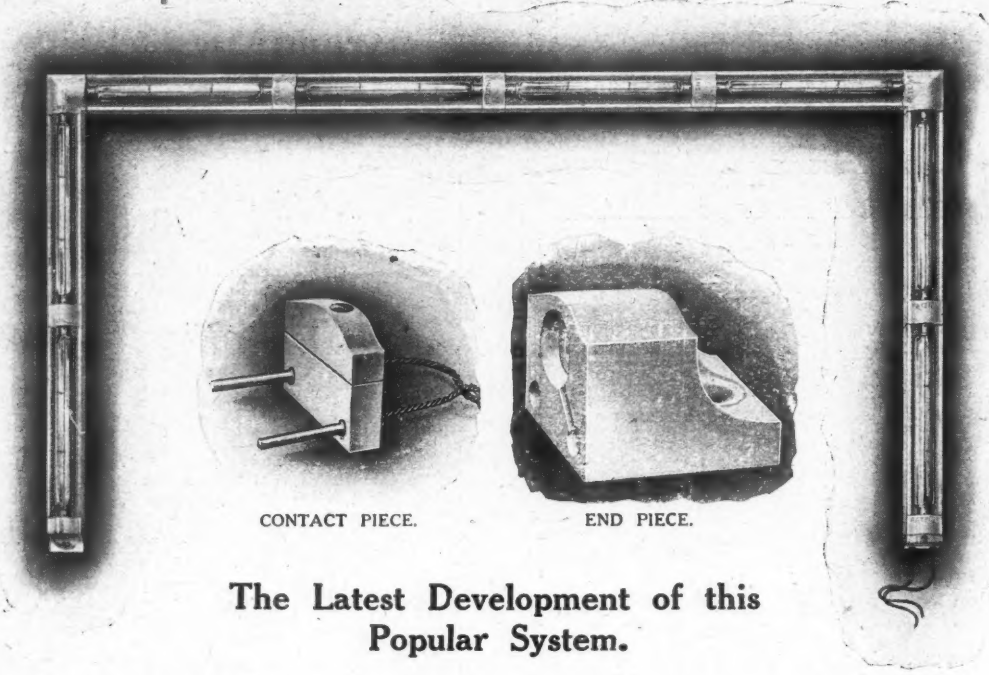

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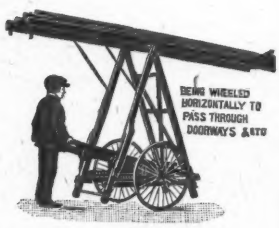

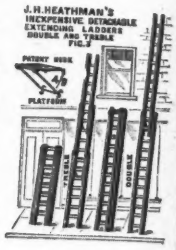

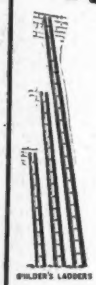

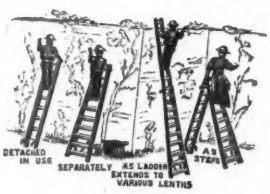

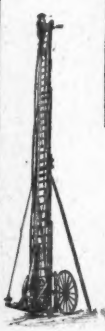

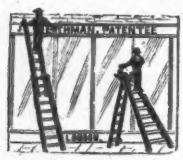

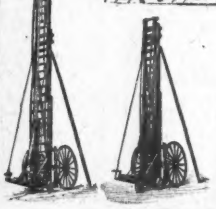

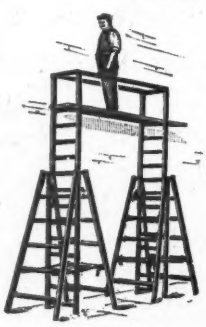

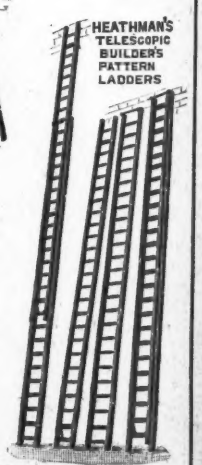

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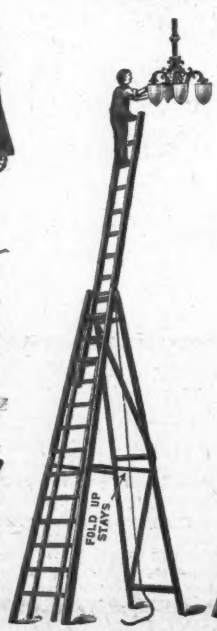

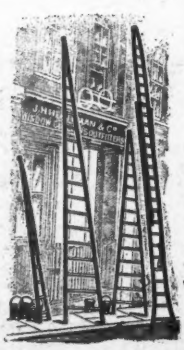

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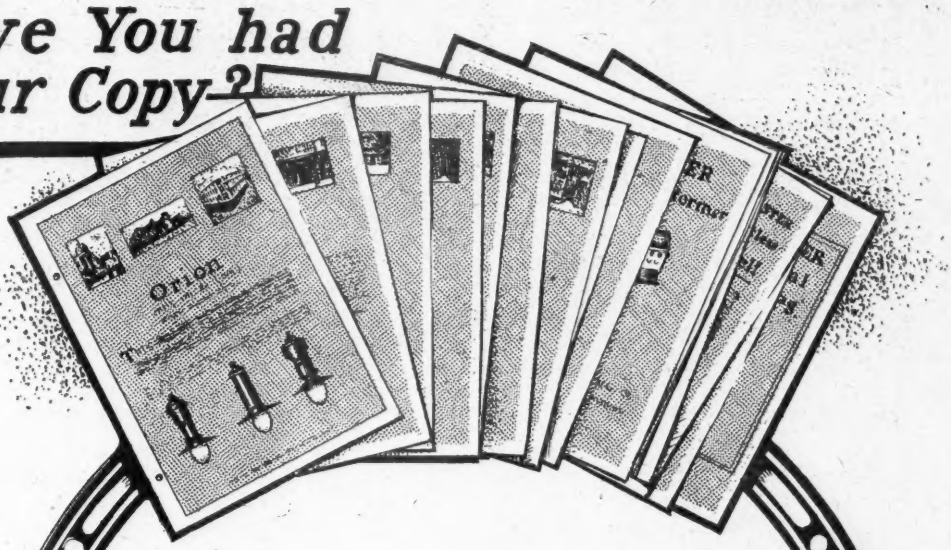

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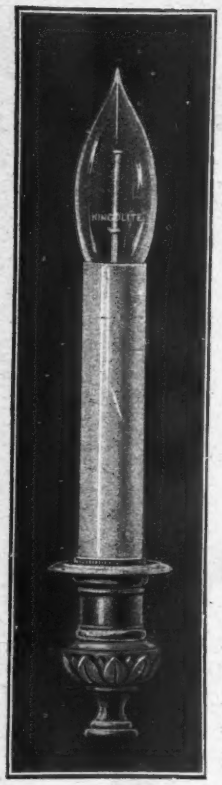

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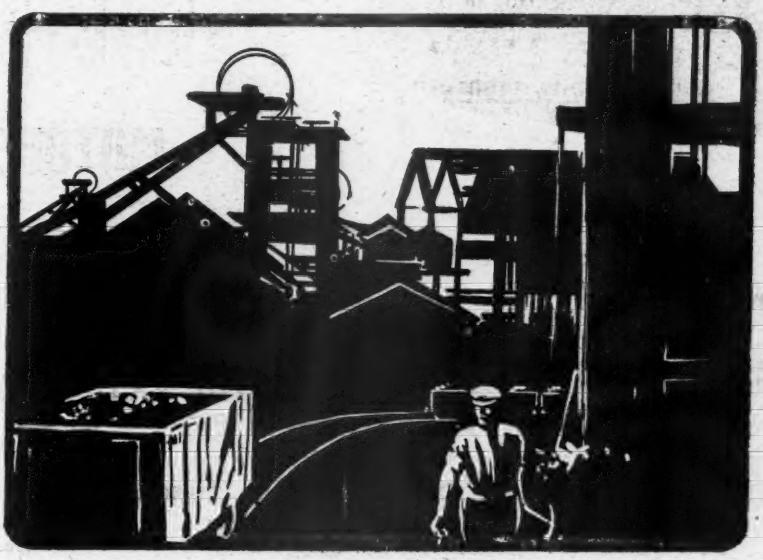

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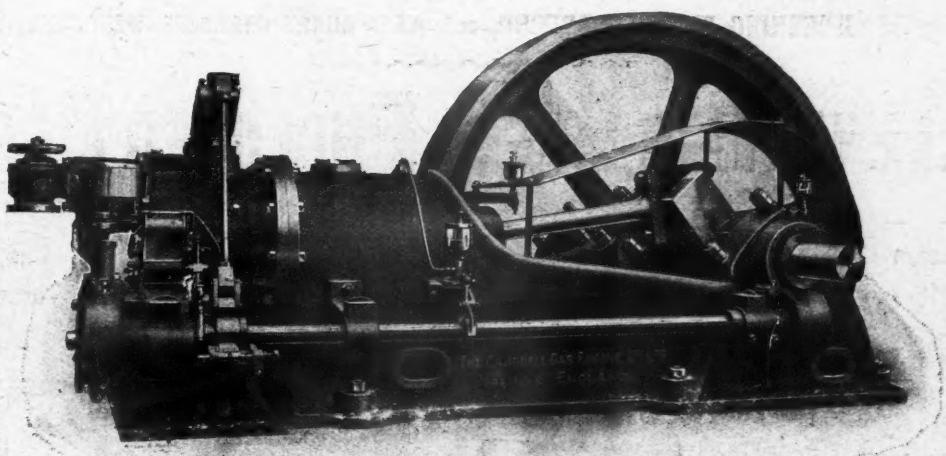

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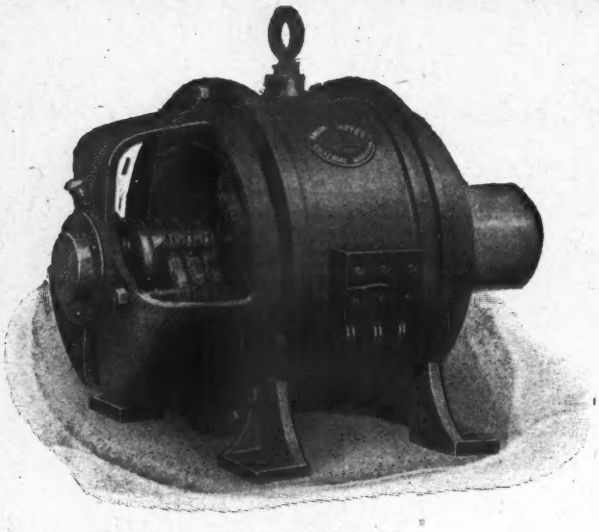

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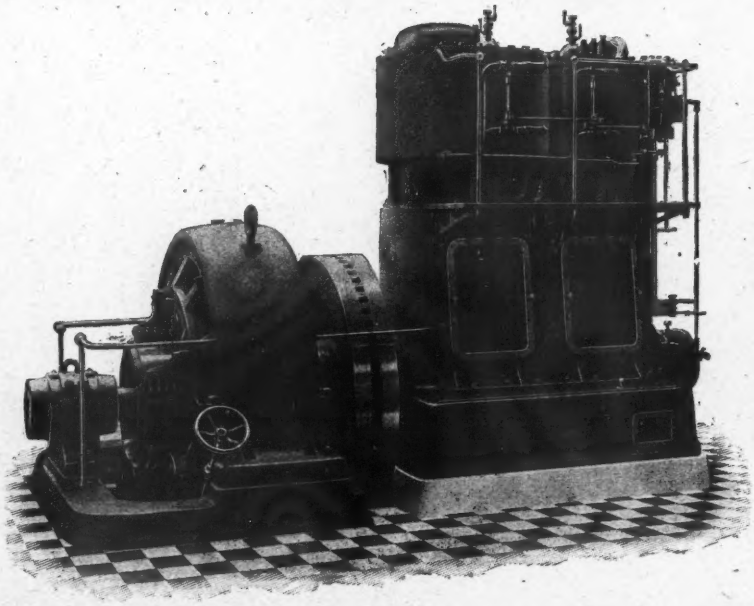

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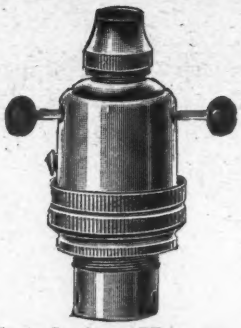

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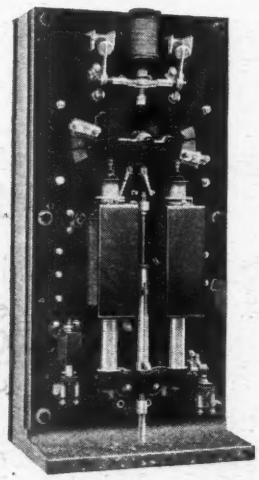

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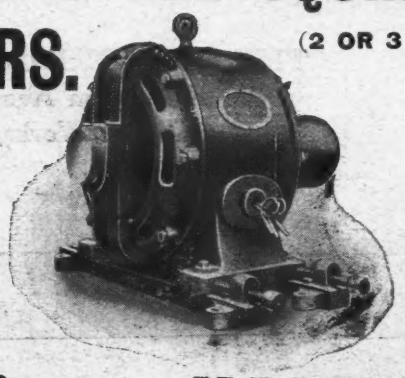

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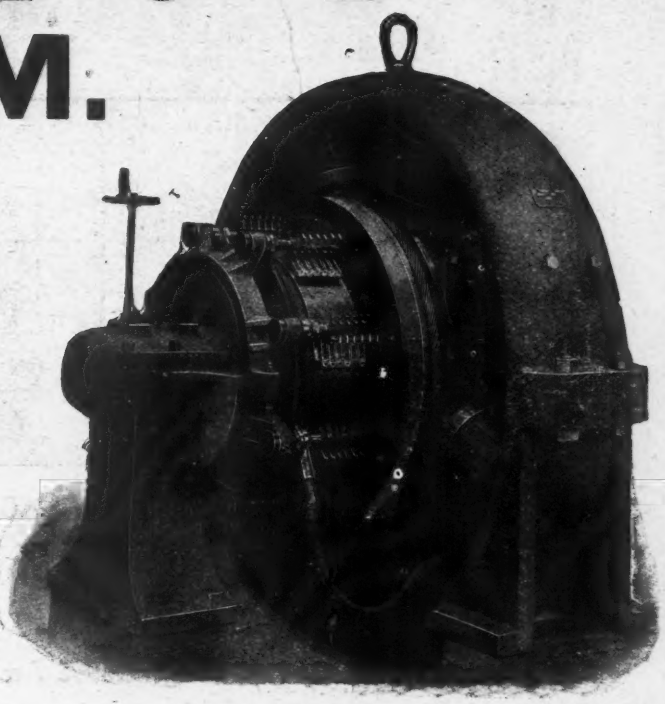

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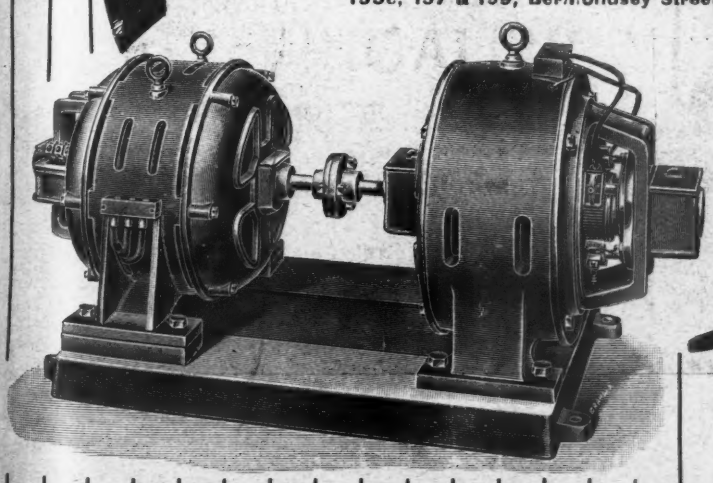

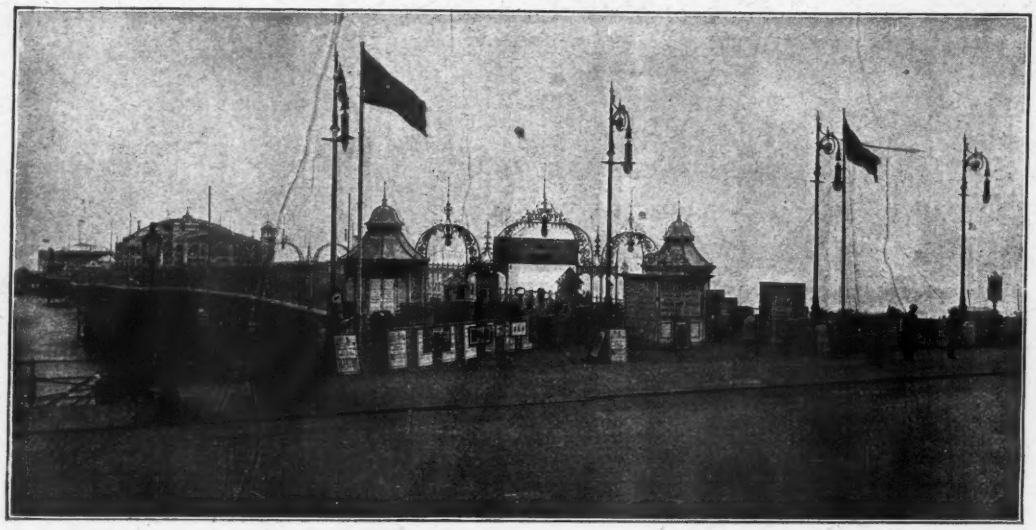

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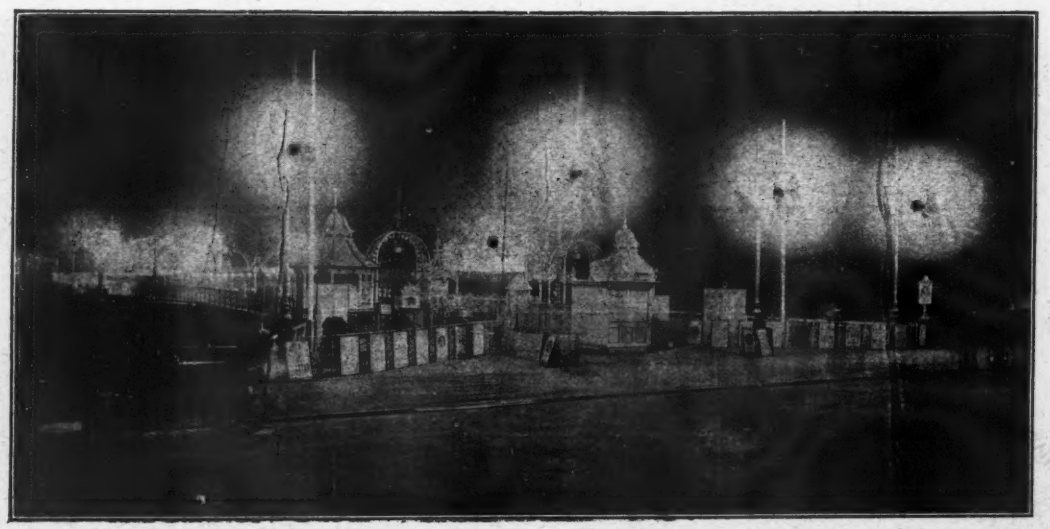

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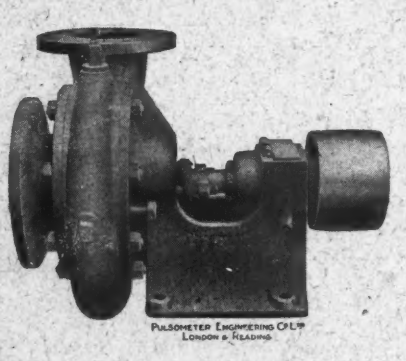

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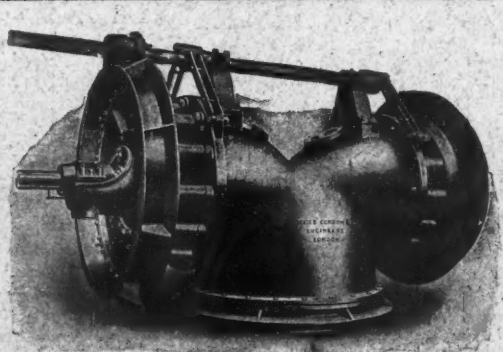

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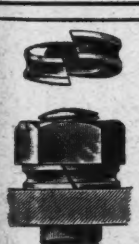

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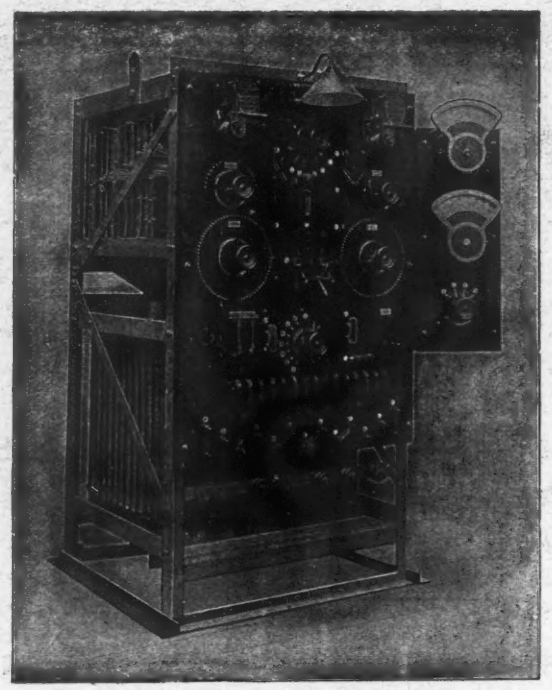

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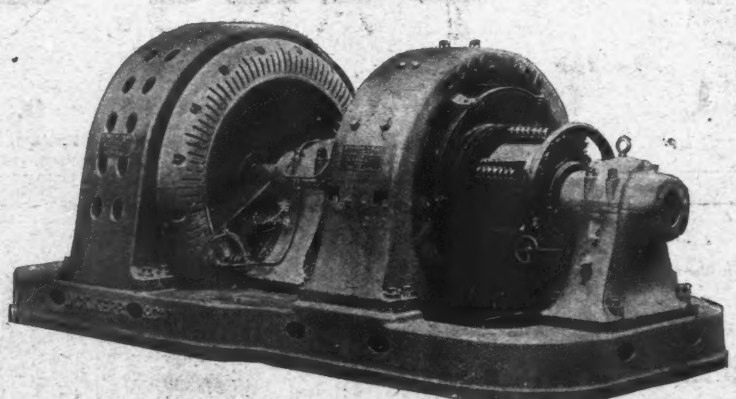

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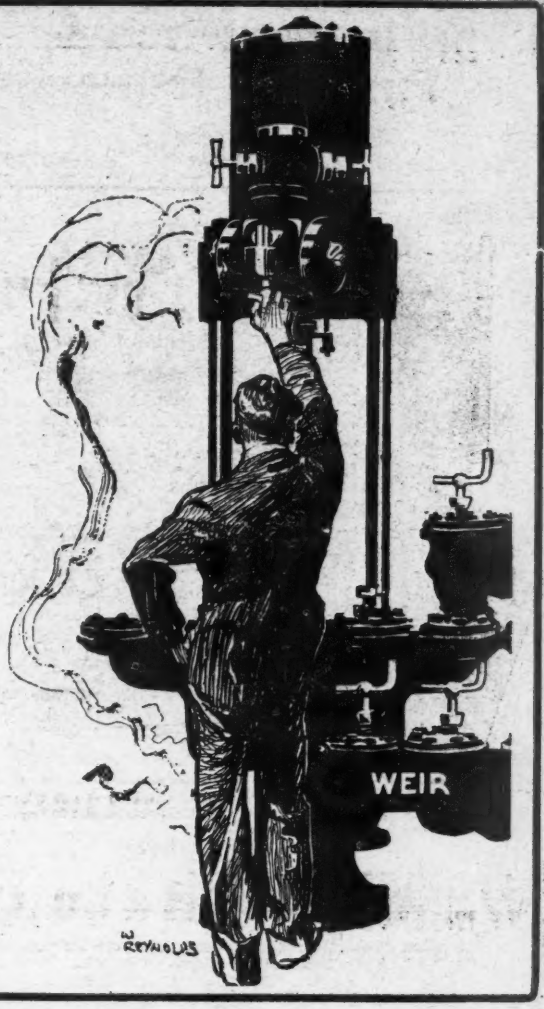

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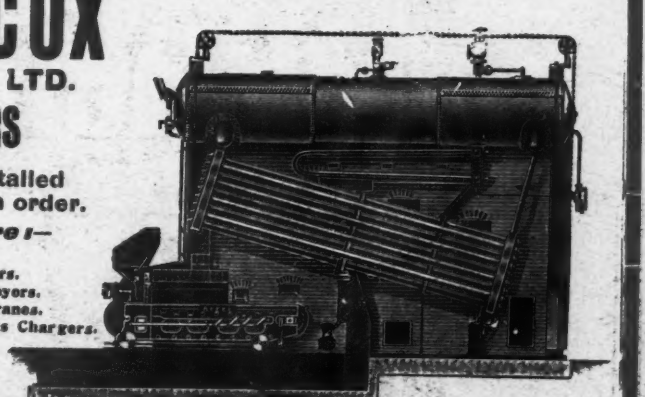

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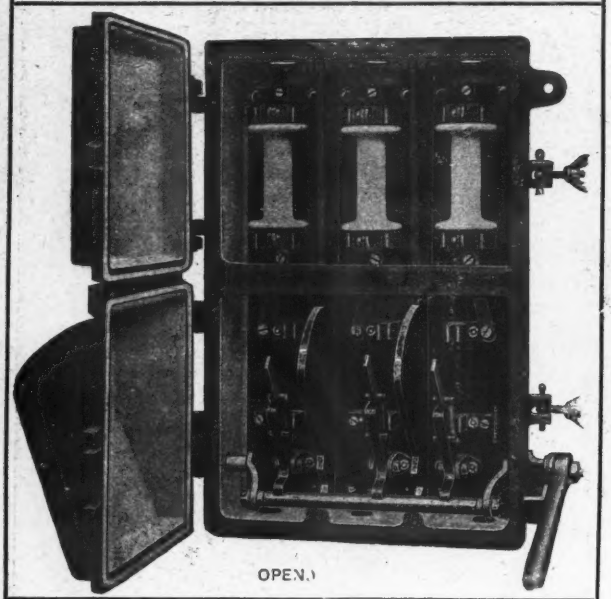

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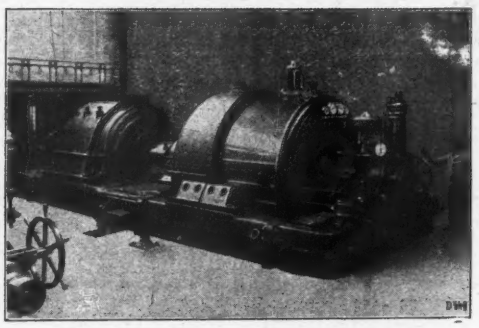

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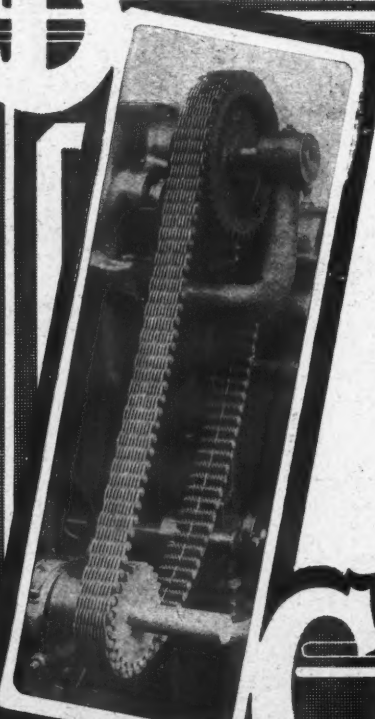

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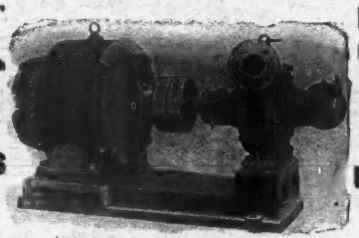

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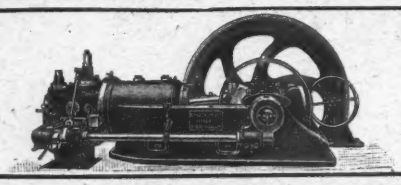

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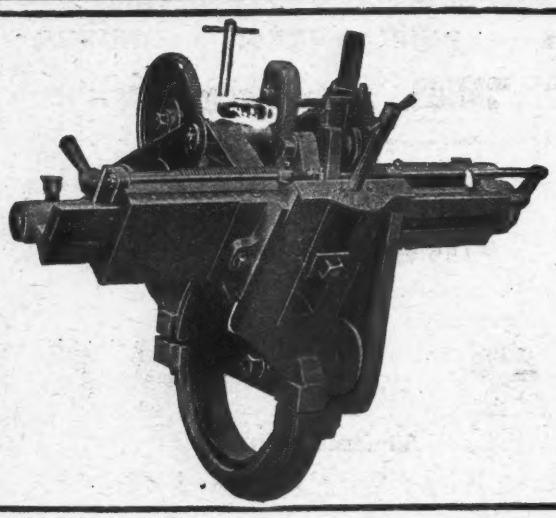

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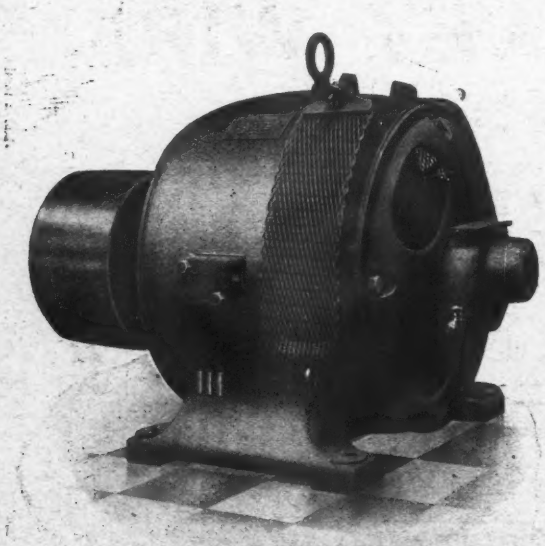

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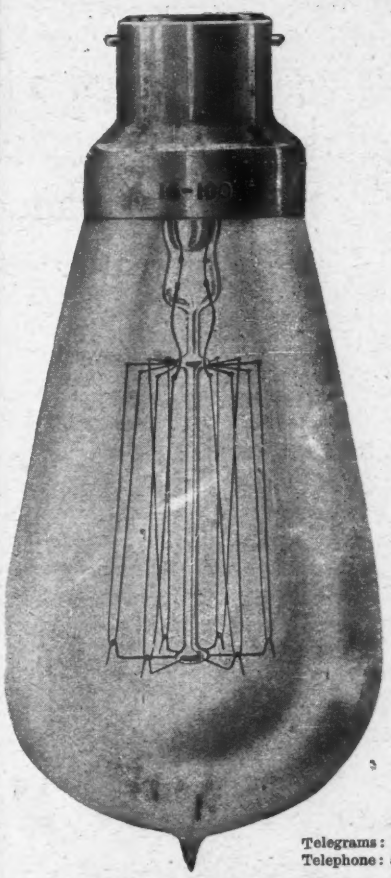

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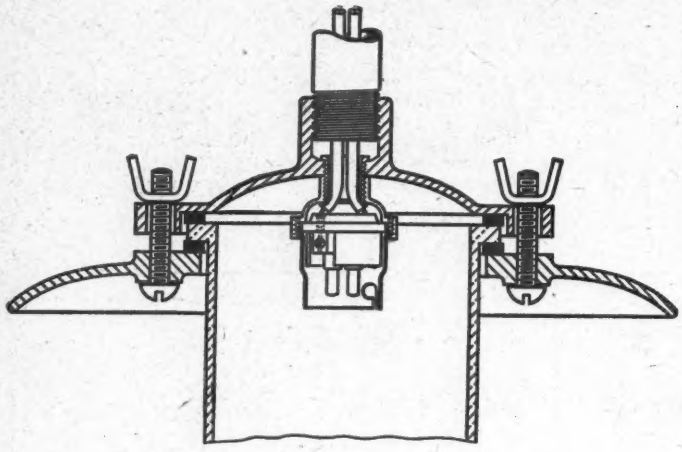

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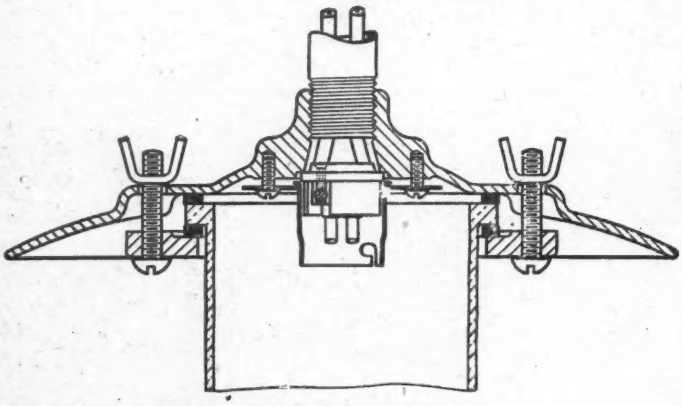

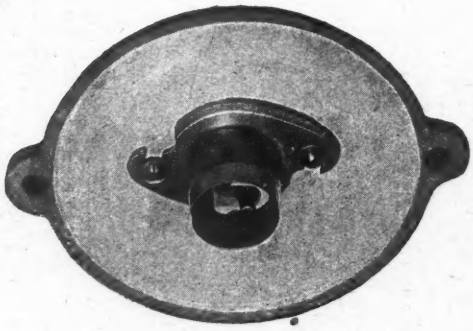

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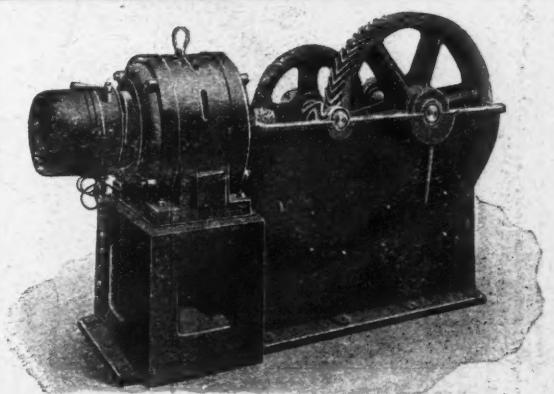

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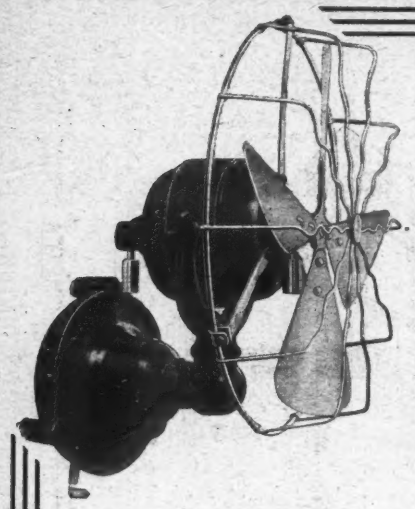

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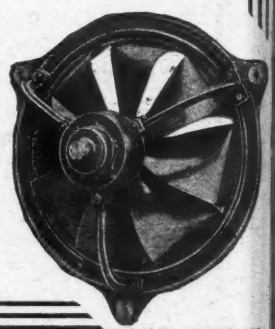

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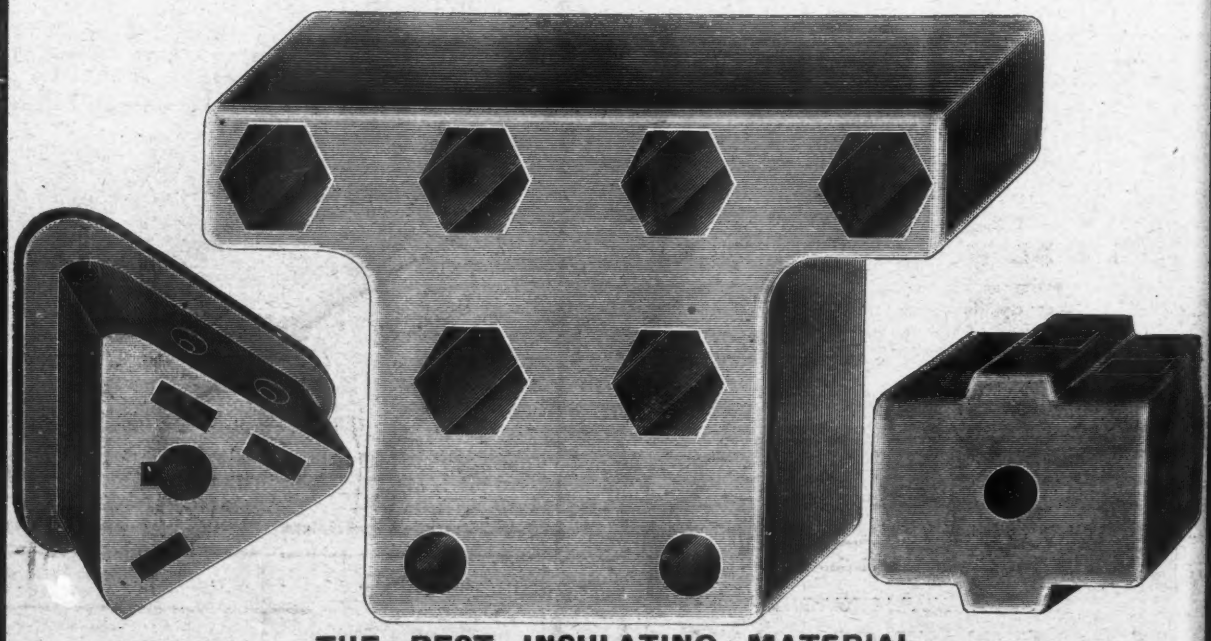

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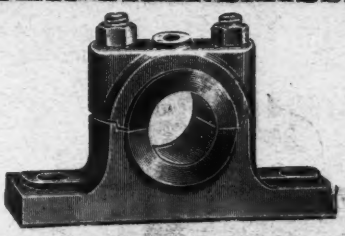

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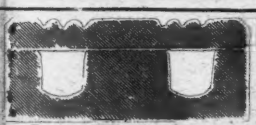

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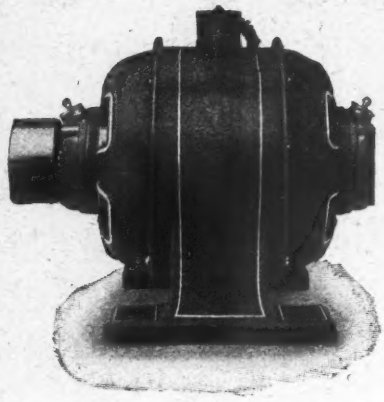

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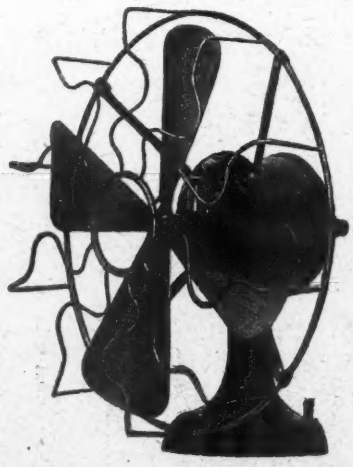

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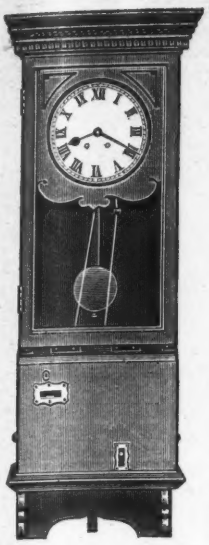

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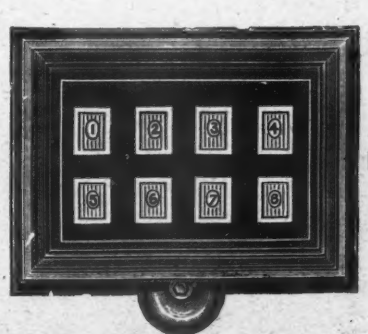

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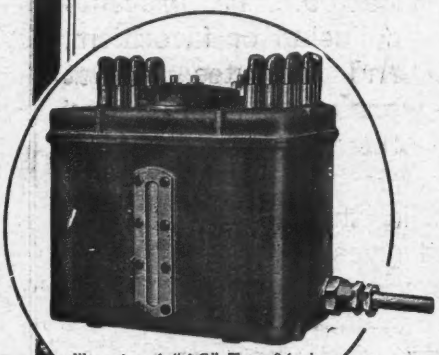

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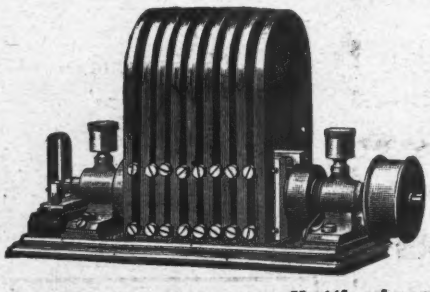

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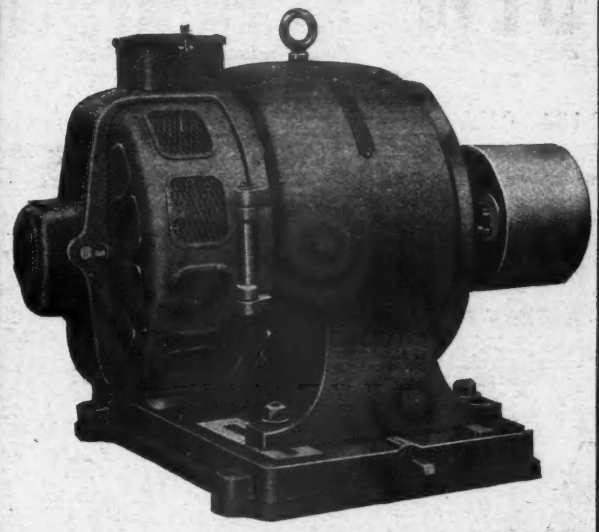

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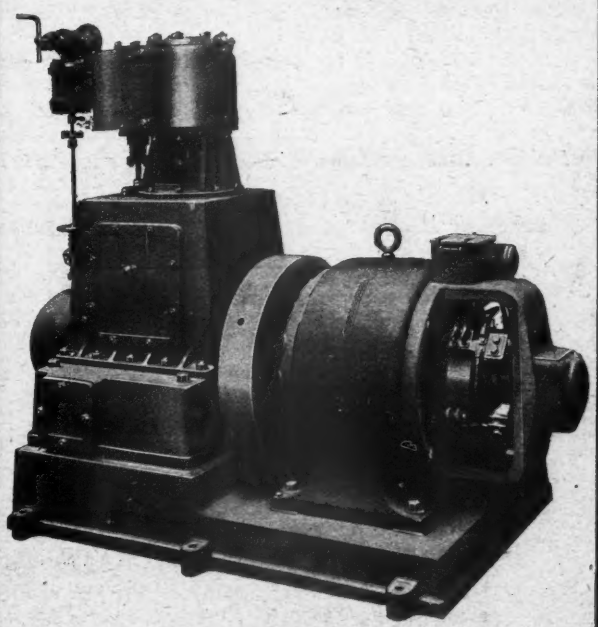

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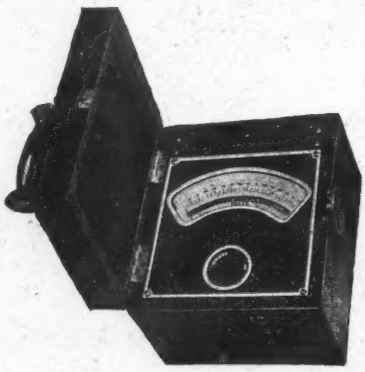

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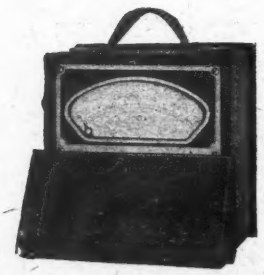

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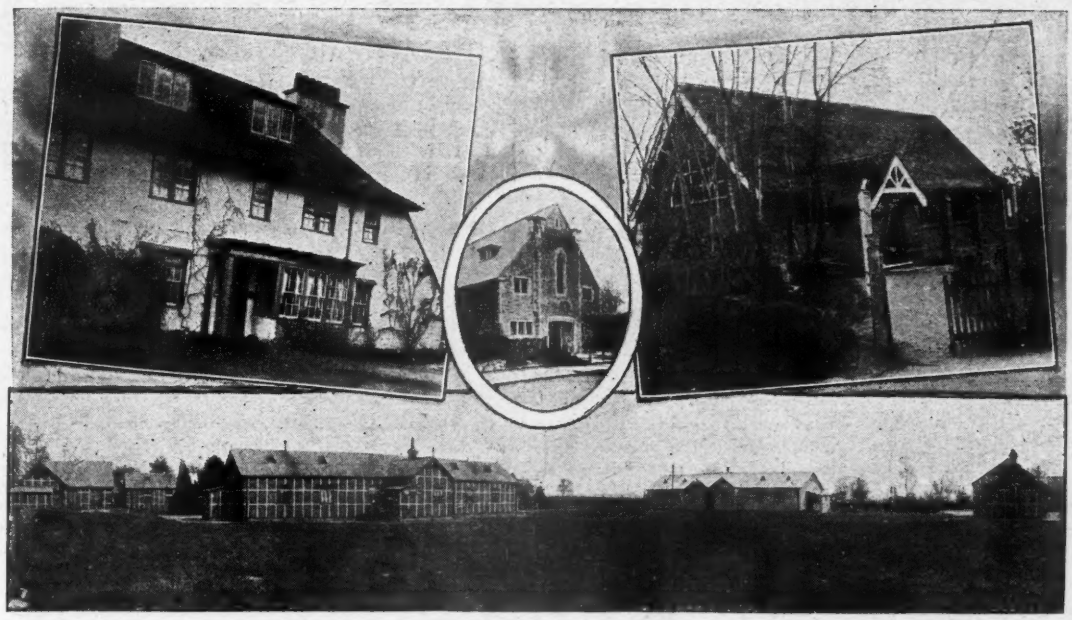

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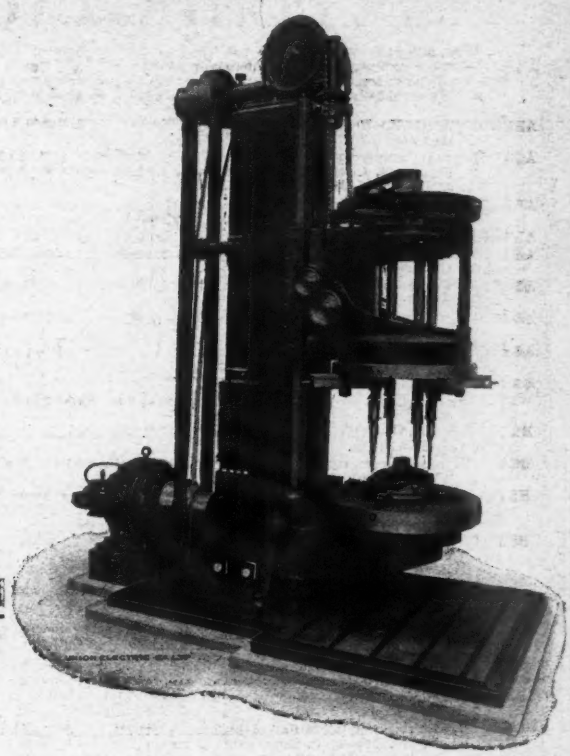
CARDIFF—Dragon Buildings, Paradise Place (Mr. H. Nance); **DUBLIN**—Norwich Union Chambers, Dawson Street (Mr. D. J. Doolan);
LEEDS—11, Upper Mill Hill, Boar Lane (Messrs. Casperson Bros.); **MIDDLESBROUGH**—303, Linthorpe Road (Messrs. J. T. Bell & Co.);
NEWCASTLE-ON-TYNE—25, Pilgrim Street (Mr. B. T. Dale); **SHEFFIELD**—74, High Street (Mr. Wm. Molesworth).



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CONTRACTORS' COLUMN.

[The following information is published in the interests of electrical contractors and others who are seeking for openings for new business. Considerable expense is incurred in the production of this column, and every care is taken to ensure that the information is new and accurate, but it will be understood that in a matter where so many correspondents are engaged, and where the amount of information to be handled is very large, this cannot always be guaranteed. If alleged inaccuracies are reported to the Editors, they will be fully investigated.]

ABERDEENSHIRE.—Rebuilding Mason Lodge, Skene; W. E. Gauld, architect, Dee Street, Aberdeen.

ACRISE (near FOLKESTONE).—Residence, lodge, stables, &c., for G. T. Treharne, 14, Church Place, Porthcawl, Bridgend; H. F. Mence, architect, St. Peter's Street, St. Albans.

ALDERSHOT.—Business premises, for Dickenson & Co.; Friend & Lloyd, architects, 45A, Grosvenor Road, Aldershot.

ALTRINCHAM (CHESHIRE).—Refuse destructor; Surveyor, Council Offices.

AMMANFORD.—School (£7,000); W. F. Morgan, architect, 24, King Street, Carmarthen.

ASHFORD (MIDDLESEX).—Church of St. Hilda; J. S. Alder, architect, 1, Arundel Street, Strand, W.C.

ASHTON-ON-MERSEY (near MANCHESTER).—Villa residences; A. Cordingley, builder, Ashton-on-Mersey.

ASHTON-UNDER-LYNE.—Extensions, &c., for the Ashton Co-operative Society.

BATH.—Alterations to Cattle Market (£1,350); F. J. Amery, builder.

BATLEY.—Extensions to premises, Bradford Road, for Walker & Smith, engineers.

BEDALE (YORKS.).—Extensions at workhouse; B. W. Swarbreck, Clerk to the Bedale Union.

BEESTON (near NOTTINGHAM).—Extension of Gospel Mission Hall, Willoughby Street (£1,000).

BETTWS GARMON (near CARNARVON).—Establishment of ironstone smelting works, with electrical equipment, by a new company; Mr. Rowe, resident engineer.

BEXHILL.—Bungalow, Manor Road; J. H. Lye, architect, Station Road, Bexhill. Five detached houses, Manor Road; A. C. D. Hicks, architect, Sea Road, Bexhill. Picture theatre; A. C. D. Hicks, architect, 4, Sea Road, Bexhill.

BINGLEY.—Variety hall, Wellington Street, for the Co-operative Society, Ltd.

BIRMINGHAM.—Proposed children's homes at Shenley Fields; Clerk to the B. of G.

BLACKBURN.—Renovation of Mill Hill Congregational Church (£1,200); J. T. Henshaw, architect, Blackburn.

BLACKROD (near WIGAN).—Extensions at Huyton Bleach Works, for the Proprietors.

BOLTON.—Re-erection (after fire) of business premises, St. George's Road, for W. Morris & Sons, cabinet makers. Pending extensions; Haslam, cotton spinners, Barlow & Jones, cotton spinners, and Bolton Co-operative Society.

BOURNEMOUTH.—Reconstruction of business premises, Old Christchurch Road, for Williams & Hopkins, drapers.

BRADFORD.—Alterations at Technical College; Director of Education, Town Hall, Bradford.

BRENTFORD.—Extension of Workhouse laundry; N. Parr, architect, 52, Kew Bridge Road, Brentford.

BRENTWOOD.—Large residence at Warley; H. R. Bird, architect, St. Thomas Gate, Brentwood.

BRIDGEND.—Extensions, &c., for Shepherd & Sons, Ltd., New Foundry, Bridgend.

BRISTOL.—Academy of Fine Arts; Silcock & Reay, architects, Milsom Street, Bath.

BULWELL (NOTTINGHAM).—Improvements pending; W. Rigley, railway wagon builder.

BURTON-ON-TRENT.—Restoration of Christ Church (£1,500); Vicar.

CAERPHILLY.—Picture theatre and music hall, between the Olde Blue Bell Hotel and the Boar's Head Hotel (seat 1,000), for the Castle Theatre and Music Hall Co., Ltd.

CALTHWAITE (CARLISLE).—New church; J. H. Martindale, architect, Carlisle.

CAMBRIDGE.—Garage (£3,594); S. French, architect, 1, Regent Street, Cambridge. Alterations and additions to Pampisford Hall (£1,950); S. French, architect.

CARRINGTON (NOTTS.).—Parish church (£10,000); W. C. Green, architect, 14, Gray's Inn Square, London, W.C.

CHARD.—New Y.M.C.A. premises (£1,000); T. Cozens, hon. general secretary.

CHEADLE (near STOCKPORT).—Picture theatre, Stockport Road, for Warburton & Lomas, Peel Road, Ramsbottom. Picture theatre, High Street, for Mr. Burns; Ginger, Lee & Co., builders, Manchester.

CHELMSFORD.—Additions to works, for Clarksons, Ltd., motor-car makers.

CHELTENHAM.—Domestic science block, Gloucester Road school; Chatteris and Smithson, architects, Regent Street, Cheltenham.

CHICHESTER.—Interior reconstruction and enlargement of Chichester Infirmary; Privett & Co., builders, Southsea.

CHISLEHURST.—Rebuilding Black Horse Hotel, Biggin Hill, for Nalder and Collyer's Brewery Co., Croydon (£1,685); C. A. Bulley, builder, Willow Grove, Chislehurst.

CLECKHEATON.—Additions to Wharfe Works foundry, for P. & C. Garnett, Ltd., machine makers; R. Castle & Son, architects, Cleckheaton.

CLYDEBANK.—Extension of office at ship-building yard, for W. Beardmore and Co., Dalmuir.

COLNE.—New shed in North Valley Road, for Foulds & Bury, cotton manufacturers, Bankfield Mill, Nelson.

CONISBOROUGH.—Proposed refuse destructor (£3,000); Surveyor to Doncaster R.D.C.

COTTINGHAM (near HULL).—Parish hall, for the U.D.C. (£2,100); A. C. Blackmore, architect, Bridlington.

COVENTRY.—Proposed Coundon waterworks; Borough Engineer.

CROYDON.—New chancel and vestry at St. Stephen's Church, Norbury; E. J. Saunders, builder, 48, Wellesley Road, Croydon. New public library at Thornton Heath (£5,000); Borough Engineer, Croydon. Alterations and improvements to South Norwood school (£1,060); G. Smyth, Town Hall, Croydon. Enlargement of Ecclesbourne Road school; H. C. Pegg, architect, 35, Parliament Street, Westminster, S.W. Block of shops, Brigstock Road (£1,320); E. A. Tyler, surveyor, 11, Queen's Walk, Ealing, W.

DONCASTER.—Restoration of the parish church; Rev. Canon Fandford, The Vicarage. New branch shops projected; Doncaster Co-operative Society.

DORKING.—Enlargement of the parish church; Vicar.

DUNDEE.—Additions to King's Cross Hospital; J. Thomson, city engineer.

DURHAM.—Alterations and additions at the Workhouse; Clerk to the B. of G.

EASINGTON (Co. DURHAM).—One hundred houses, for the Easington Coal Co. Proposed Murton sewage works; Surveyor to R.D.C.

EDINBURGH.—Alterations at St. Bernard's School, Dean Park Street; J. W. Peck, Clerk to the Board, School Board Office, Castle Terrace Edinburgh.

EGERTON (near BOLTON).—Extensions at bleach works, for Messrs. Deakin.

EXETER.—Alterations and additions to premises, Cathedral Yard, for the Prudential Assurance Co., Ltd., Holborn Bars, London, W.C.

EXMINSTER (near EXETER).—Pathological laboratory, for Devon C.C., at the County Lunatic Asylum; E. H. Harbottle, architect, Queen Street, Exeter.

FAILSWORTH (near OLDHAM).—Alterations and additions to the Council offices; W. M. Shimmin, Surveyor to the Council, Oldham Road.

FLEETWOOD.—Conversion of chapel building in Lord Street into picture theatre, for the Empress Picturedrome, Ltd.

FOLESHILL.—Mill, with spinning and reeling sheds, &c., for S. Courtauld and Co., Ltd., artificial silk manufacturers; J. G. Gray, builder, Foleshill. Mess room block, for the same firm; Walter Jones and Sons, builders, Westminster, S.W.

GARSTANG.—New offices, Lancaster Lane, for the R.D.C.; W. Kelly, architect, Garstang. Proposed additions to Shireshead Institute, Forton; Secretary.

GERRARD'S CROSS.—New post office, for H.M. Office of Works, Storey's Gate, London, S.W.

GIFFNOCK (GLASGOW).—Four villas in Eastwood Avenue; J. Taylor, Eastwood Avenue, Giffnock.

GLAMORGANSHIRE.—New school at Seven Sisters, domestic science centre at Oystermouth, and domestic subjects centre at Bridgend, for the C.C.; T. M. Franklen, Clerk, Westgate Street, Cardiff.

GLASGOW.—Six villas in Langside Road, Newlands; J. Allan, 565, Cathcart Road, Glasgow. Picture hall and offices, Baker Street, Langside; J. Hamilton, printer, 213, Buchanan Street, Glasgow. Extensions to buildings, Stanley and Vermont Streets, for Hay Bros., Ltd., confectioners, Vermont Street, Kinning Park, Glasgow. Addition to bakery, Hyde Park Street, for Bilsland Bros. Stores, Great Eastern Road; A. G. Barr & Co., Ltd., mineral water manufacturers, 482, Great Eastern Road, Glasgow. Shops and houses, Castle Street, for P. & F. Sherry, wine and spirit merchants, 289, High Street, Glasgow. Alterations and additions to buildings, Buchanan Street and Germiston Street, for the Caledonian Railway Co., St. Rollox, Glasgow.

GOUROCK (near GREENOCK).—Waterworks scheme at Daff Burn, for the T.C. (£20,000); A. Leitch, engineer, Glasgow.

GREAT HARWOOD (near BLACKBURN).—New Church of England School contemplated; Vicar.

HADLOW DOWN (near UCKFIELD).—New Parish Church; G. H. F. Prynne, architect, 6, Queen Anne's Gate, Westminster, S.W.

HALE (CHESHIRE).—New church, for Ashley Road Congregation (£4,700); M. Stone & Sons, builders, Altrincham.

HASLINGDEN.—Further extensions for the Industrial Manufacturing Co.

HASTINGS.—Alterations to the Grand Hotel; H. Ward, architect, 8, Bank Buildings, Hastings.

HEAVITREE.—Territorial headquarters, for the Devon Territorial Force Association; Secretary, Exeter.

HEBDEN BRIDGE (YORKSHIRE).—Station, &c., improvements; L. & Y. Railway Co., Hunts Bank, Manchester.

HEMEL HEMPSTED.—Cinematograph theatre, London Road, for H. G. Darer.

HEREFORD.—School; G. H. Jack, County Architect, Shire Hall, Hereford.

HIGH WYCOMBE.—Probable re-erection (after fire) of Frogmoor Electric Picture Palace; S. M. Webb, owner. New place of worship and schools, Sands Road, for the Primitive Methodist Church; A. W. Nash, architect, Priory Avenue, High Wycombe.

HOLT (NORFOLK).—New chapel at Gresham's School (£5,000); G. W. S. Howson, head master.

HOREHAM ROAD (SUSSEX).—New parsonage house, for the wardens of Christ Church (£1,300); V. E. Young, architect, 12, Buckingham Street, Strand, W.C.

HORLEY (SURREY).—Picture theatre and business premises, Victoria Road, for J. T. Stacey, Lumley Road, Horley.

HORSHAM.—Large residence, St. Leonard's Forest; J. C. Jonas & Sons, architects, 8A, Whitehall, S.W.

HUDDERSFIELD.—New Liberal Club premises at Aldmondbury (£1,800); J. L. Sheard, secretary.

INVERKEITHING (FIFESHIRE).—Proposed new goods station, for the North British Railway Co.; Engineer-in-Chief, Edinburgh.

IPSWICH.—Factory, Princes Street; G. W. Leighton, architect, 21, Museum Street, Ipswich.

KEIGHLEY.—Congregational Mission Church, Queen's Road, Ingrow; J. Haggas & Sons, architects, North Street, Keighley. Additions to shop premises, East Parade, for R. Sugden. Bank premises, North Street, for the West Yorkshire Bank, Ltd. Additions to works, Brewery Street, for Hall & Stells, machine makers.

KETTERING.—Additions to factory, Stamford Road, for G. Poulton, shoe manufacturer.

KINGSWOOD (near BRISTOL).—Probable re-erection (after fire) of portion of factory, for Monks & Co., boot manufacturers.

KIRKINTILLOCH.—Extension of Lairdsland School (£2,000); Clerk, School Board.

KNEBWORTH (HERTS.).—Proposed new church, Garden Village (£5,000); E. L. Lutyens, architect, 29, Bloomsbury Square, London.

LEEDS.—Proposed picture palace, corner of Orchard Street, South Accommodation Road; J. E. Rhodes, Basinghall Square, Leeds. Alterations to Scotsman Hotel, Call Lane; J. Jackson, architect, Sunbridge Road, Bradford. Villa residence, off York Road, for C. H. Pinder, and pair of semi-detached residences off York Road, for T. Anderton and E. H. Hazzlewood; T. A. Buttery, architect, Queen Street, Morley, and 1, Basinghall Square, Leeds.

LEICESTER.—Additions to laundry, &c., at the City Asylum, for the T.C. (£9,500).

LEOMINSTER.—Drill hall, lecture room, &c., for the Herefordshire Territorial Force Association; Nicholson & Clarke, architects, Cathedral Chambers, Hereford.

LEITH.—Hall at Henderson Street, for J. Hope's Trustees.

LETCHWORTH.—New bank, for the London, City and Midland Bank, Ltd., London. Large additions to works, for the Spirella Corset Co. (about £8,000). Projected extensions by the Lacre Motor-Car Co.

LICHFIELD.—Sub-post office, Whittington Barracks; Postmaster, Lichfield.

LITTLEBOROUGH (near ROCHDALE).—Proposed extensions at Sladen Mill, for C. Kershaw, Ltd.

LIVERPOOL.—Picturedrome, billiard hall, skating rink, &c., Park Road and Gredington Street, for Dingle Picturedrome, Ltd.; E. Haigh, picturedrome proprietor, 61-63, Pembroke Place, Liverpool.

LLANDRINDOD WELLS.—Conversion of Berkeley private hotel into club and central offices, for the Liberal Club; the Secretary.

LLANELLY.—Improvements; Waddle Patent Fan and Engineering Co., Ltd., Llanmore Works, Llanelly.

LONDON.—(HOMERTON, N.E.).—Branch library, Brooksby's Walk, for the Hackney B.C.; E. Cooper, architect, 12, Gray's Inn Square, W.C.

(S.E.).—Re-erection of 42-44, Old Kent Road; L. King & Son, architects, 171, Victoria Street, S.W.

(CAMBERWELL, S.E.).—Chapel, Collyer Place, for the Building Committee, Hanover Chapel, Peckham, S.E.

(GREENWICH, S.E.).—Alterations to premises of Thames Export Packing Co., Ltd.; W. F. Blay, Ltd., builders, 30A, Spital Street, Dartford. Mission hall, Trafalgar Road; W. Harbrow, builder, South Bermondsey Station, S.E.

(HERNE HILL, S.E.).—Cinematograph theatre (seat 500), for Cinema Enterprises, Ltd.

(*Continued on page* xxiv.)

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CONTRACTORS' COLUMN.—*Continued from page* xxii.

LONDON (LAMBETH, S.E.).—Cinematograph hall, Dulwich Road; F. E. Harris, architect, 142, Mile End Road, E.

(WOOLWICH, S.E.).—Buildings at the Arsenal, for the War Office (£75,000); W. F. Blay, Ltd., builders, Dartford. Building on site of 93 and 95, New Road; P. Arundell & Sons, builders, 49, New Cross Road, S.E.

(S.W.).—Underground convenience, Vauxhall Bridge Road (£1,600); J. W. Bradley, City Engineer, Town Hall, Westminster, S.W. Building in Buckingham Palace Road; G. T. Jell, architect, 70, Carlton House, Regent Street, W.

(BALHAM, S.W.).—Weir Hospital, Grove Road; R. J. Thomson, architect, 49, Hill Road, Wimbledon, S.W.

(PUTNEY, S.W.).—Additions to All Saints' Church, Putney Lower Common; W. R. Williams, 98, High Street, Putney.

(W.).—Hotel, Oxford Street; Boehmer & Gibbs, architects, 11, Spring Gardens, S.W. Proposed cinematograph theatre, Marylebone and and Edgware Roads; Gale, Duriacher & Emmett, architects, 15, New Bridge Street, E.C.

(W.C.).—Reconstruction of the Tivoli Music Hall, Strand; Wylson and Long, architects, 16, King William Street, Strand, W.C. Rebuilding 51 and 52, Chancery Lane and 22, and 23, Southampton Street; Thurgood & Martin, surveyors, 27, Chancery Lane, W.C.

LUTON.—Additions to Liberal Club premises, Manchester Street; H. Lacey and Son, builders, Manchester Street. Extension of Old Bedford Road school; Borough Engineer, Town Hall, Luton.

MANCHESTER.—Alterations at laundry, Infirmary, Charlestown Road, Blackley, for the Prestwich B. of G.; Steward of the Infirmary. Pending improvements; F. Pearn & Co., Ltd., engineers, Manchester.

MERTHYR TYDFIL.—Alterations, &c., to business premises, High Street, Penydarren, for S. Freedman, house furnisher.

MEXBOROUGH (near DONCASTER).—Alterations at the County Police Station, for the West Riding Standing Joint Committee, County Hall, Wakefield.

MIRFIELD.—Electric light installation at the grammar school and head master's house, for the Governors.

MITCHAM.—Baptist school chapel (£1,000); R. J. Thomson, architect, 49, Hill Road, Wimbledon.

MOORTHORPE (near BARNSLEY).—Proposed picture palace, for Walker, Issott & Co., Ltd. New Church of England chapel and Sunday school premises; Vicar. Alterations at the County Police Station, for the West Riding Standing Joint Committee, Wakefield.

MORLEY (near LEEDS).—Improvements contemplated; Ackroyd & Best, Ltd., safety lamp makers.

MOTHERWELL.—Additions to Dalziel and Camp Street schools (£4,000) and proposed new High School; Clerk, Dalziel School Board.

MUSSELBURGH.—Proposed new municipal buildings (£7,000).

NELSON.—Extension at Clover Mill, for Riddick, Stuttard & Co.

NEW MILLS (DERBYSHIRE).—Contemplated alterations, &c., for the local Co-operative Society.

NEWPORT (I. OF W.).—Offices and furniture repository, Quay Street, for Crouchers, Ltd.; Stratton & Milligate, architects, 21, Quay Street, Newport.

NEWTON ABBOT.—Assembly hall for Mid-Devon Constitutional Club; F. E. Lloyd-Downes, architect, 86, Queen Street, Newton Abbot.

NORTHWICH.—Alterations and additions to the Novelty Iron Works, for R. White & Co., engineers and ironfounders.

NORWICH.—Sewerage extensions, with electric pumping, for the T.C. (£8,181); City Engineer.

OLDHAM.—Proposed enlargement of Higginshaw Council School, Shaw Road; J. Rennie, Education Secretary, Education Offices, Union Street West.

OSWALDTWISTLE.—Proposed new Council school in Holy Trinity district; Secretary, District Education Committee. Preparation rooms at Rose Mill; Proprietors. Proposed library (£3,000); Surveyor to U.D.C. Proposed new school at Moor End; Secretary, District Education Committee. New bank, Union Road, for the Manchester and County Bank, Ltd.

OXFORD.—Probable re-erection (afer fire) of business premises, 224, Abingdon Road, for R. Cossey, stationer, &c.

PAISLEY.—Picture theatre (seat 800) for Paisley Picture Theatre, Ltd.

PARTICK.—Public baths and washhouses for Corporation; J. Bryce, Burgh Surveyor. New building for Whiteinch Established Church congregation (£5,000); the Minister.

PENDLETON.—Alterations and improvements at weaving mills, for Sir E. Armitage & Sons, Ltd.

PETERBOROUGH.—Large residence at Thornhaugh, for Stanley Brotherhood, Peterborough.

PORTLAND.—Council offices; Speir & Bevan, architects, Borough Chambers, Wharton Street, Cardiff.

PRESTON.—Proposed new Wesleyan Day Schools at Ribbleton Avenue; Superintendent Minister, Lune Street Circuit.

QUEEN'S FERRY (FLINTS).—Probable re-erection (after fire) of business premises, Chester Road, for Nicholl & Co., ironmongers and cycle makers.

RAMSGATE.—Detached house, Ellington Park Road; J. Newby, builder, Grange Road, Ramsgate.

READING.—Drill Hall; Hoare & Wheeler, architects, Friary Street, Reading.

RODLEY (YORKS.).—Renovation of Airedale Mills (after fire), for Atkinson Brothers.

ROMFORD.—Isolation Hospital; W. Smith, clerk, Guardians' Offices, Romford.

ROTHESAY.—Sewage scheme (£15,000); J. B. Brodie, civil engineer, Glasgow.

ROTHWELL.—Additions to Carlton Council School; Education Architect, County Hall, Wakefield.

ST. ALBANS.—Proposed Parochial Institute and Schools, for St. Paul's Church (£3,000); P. C. Blow, architect, 7, London Road, St. Albans.

SALFORD.—Alterations and additions to the Town Hall, Bexley Square; J. B. Broadbent, architect, 15, Cooper Street, Manchester.

SALISBURY.—Probable re-erection (after fire) of block of store rooms and warehouses, Milford Street and Brown Street, for Messrs. Sewell, house furnishers (damage, £2,000).

SCUNTHORPE.—Picture theatre (seat 480), for the Sydney Animated Picture Co., Scunthorpe.

SEAFORD.—Block of shops, Claremont Road; J. W. Hawkes, architect, Central Chambers, North Street Quadrant, Brighton.

SHEFFIELD.—Proposed extension of School of Art premises (£2,500); G. S. Baxter, Secretary, City Education Committee. Conversion of "Bole Hills" into domestic subjects centre; City Architect. Proposed Unitarian Church at the corner of Northumberland Road and Crookesmoor Road; Pastor, Upperthorpe Unitarian Chapel. New school premises; Committee, Wesleyan Reform Sunday School, Owlerton.

SMETHWICK (near BIRMINGHAM).—Proposed new school in Devonshire Road; Secretary, Education Committee.

SOUTH SHIELDS.—New home for boys at Cleadon, laundry, alterations to stores, &c., for the B. of G. (£2,749); W. D. Allison, builder, Whitburn.

SOUTHEND-ON-SEA.—Electric theatre, Southchurch Road, for R. H. Nerney. Additions to business premises, 115, Hamlet Court Road, for Freeman, Hardy & Willis, Ltd., boot dealers, Leicester. Mission Hall, West Road; H. Darbyshire.

STAFFORD.—New head post office, for H.M. Office of Works; Postmaster, Head Post Office, Stafford. Extensive business premises and offices, boardroom and hall, for the Co-operative Society.

STAVELEY.—New Wesleyan Sunday schools, Chesterfield Road (£1,100); S. Stone, builder, Staveley.

STIRLING.—Alterations to public-house, for G. H. Taylor, 7, St. John Street. Restoration of the West Kirk (£2,000); Burgh Surveyor.

SWANSEA.—Alterations and additions to the Badminton Hotel, Fleet Street, for H. Miles.

THURNSCOE (YORKS.).—Addition to the Council school; Education Architect, County Hall, Wakefield.

TIBSHELF (DERBYSHIRE).—Picture palace; J. Tomlinson, architect, South Normanton.

TOTTINGTON (near BURY).—Proposed new stores, for the Tottington Equitable Co-operative Society.

TUTBURY (near BURTON-ON-TRENT).—Proposed restoration of the church; Vicar.

WATERLOO (near LIVERPOOL).—Additions to Park House, Haigh Road, Waterloo Park, for the Community of the Augustinian Sisters; A. E. Cuddy, architect. Block of business premises, Crosby Road North; J. Pearce, architect.

WATFORD.—Mortuary, post-mortem room, &c., for the B.G.; W. H. Syme, architect, 58A, Vicarage Road, Watford.

WELLINGBOROUGH.—Considerable extensions to premises, Market Street, for the London, City and Midland Bank, Ltd., London.

WHITEFIELD (near BURY).—Contemplated alterations and extensions to the sewage works; Surveyor to U.D.C.

WESTCLIFF-ON-SEA.—New pier, with bandstand, refreshment rooms, &c. (£17,000).

WHITBY.—Business premises, corner of Bridge Street and Sandgate, for H. P. Tyler, boot manufacturer, Leicester; R. A. Wilson & Son, builders, Whitby.

WHITWOOD.—New school (320 places), for the West Riding of Yorks. C.C.; J. Stuart, architect, County Hall, Wakefield.

WINCHESTER.—Electric theatre, Middle Brook Street, for the Winchester Electric Theatre, Ltd. Extensions to Guildhall; W. T. Anderson, Surveyor, Town Hall, Winchester.

WINDSOR.—Alterations and additions to "Wexham Springs," Eton, for Col. Hanbury.

WOKING.—Proposed alterations to St. John's Church, Knaphill, near Woking (£3,600); Rev. T. W. Graham.

WOLSINGHAM (WEARDALE).—Probable re-erection, after fire, of Pavilion Theatre; the Proprietor.

WOLSTANTON.—School; E. Hollingshead, U.D.C. Offices, Wolstanton.

WREXHAM.—Proposed enlargement of the Church House; Vicar of Wrexham.

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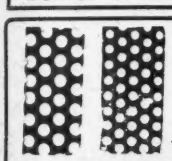

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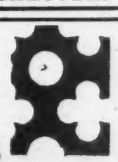

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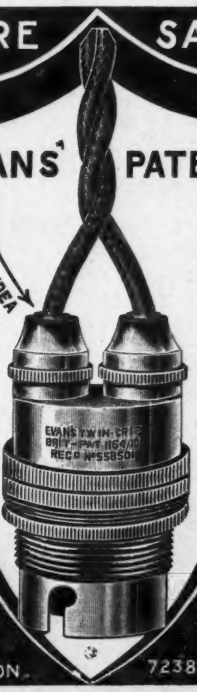

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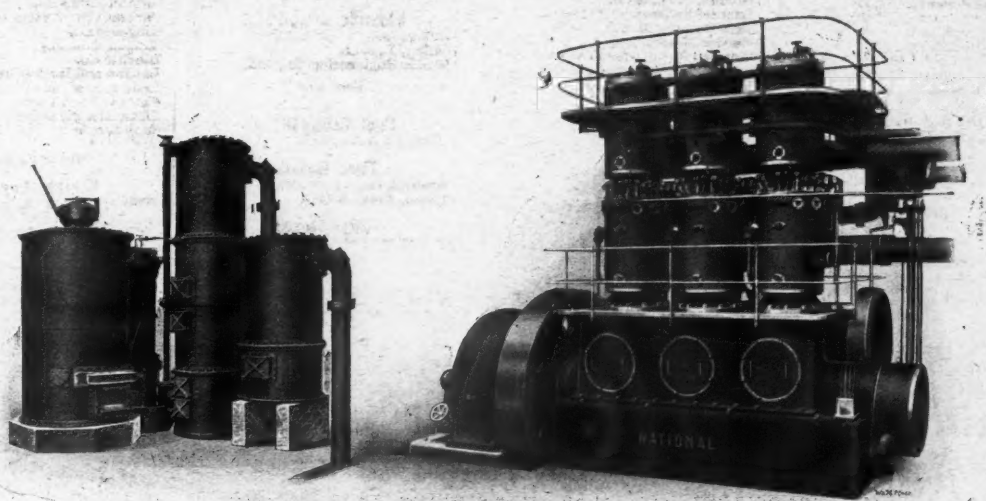

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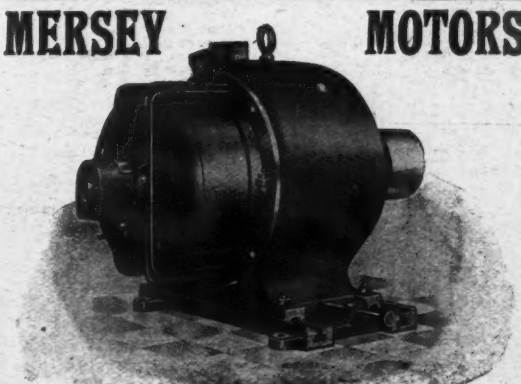

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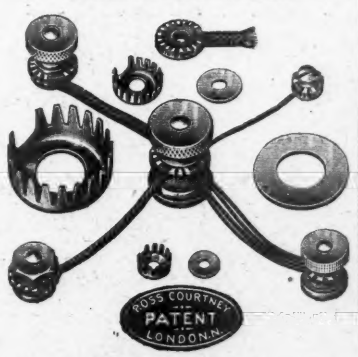

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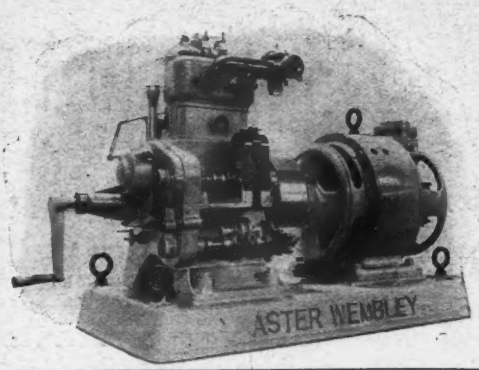

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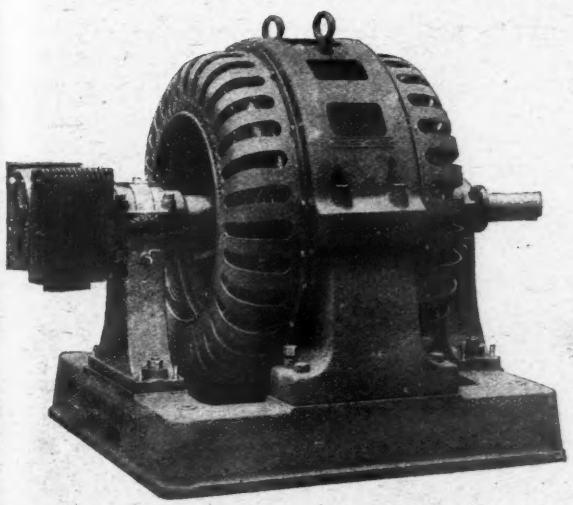

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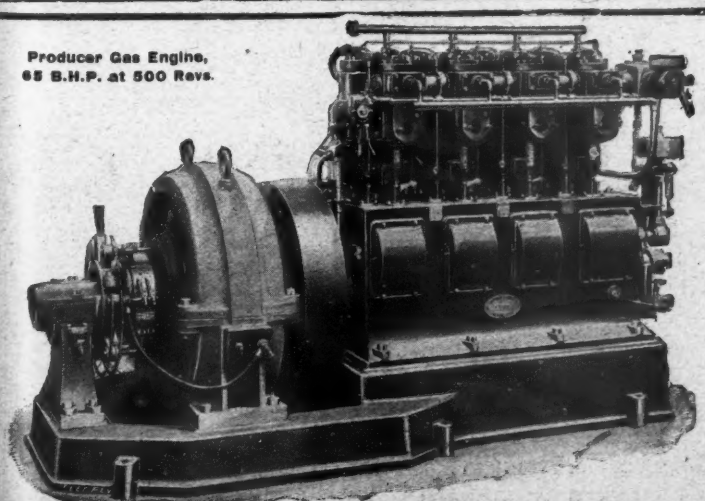

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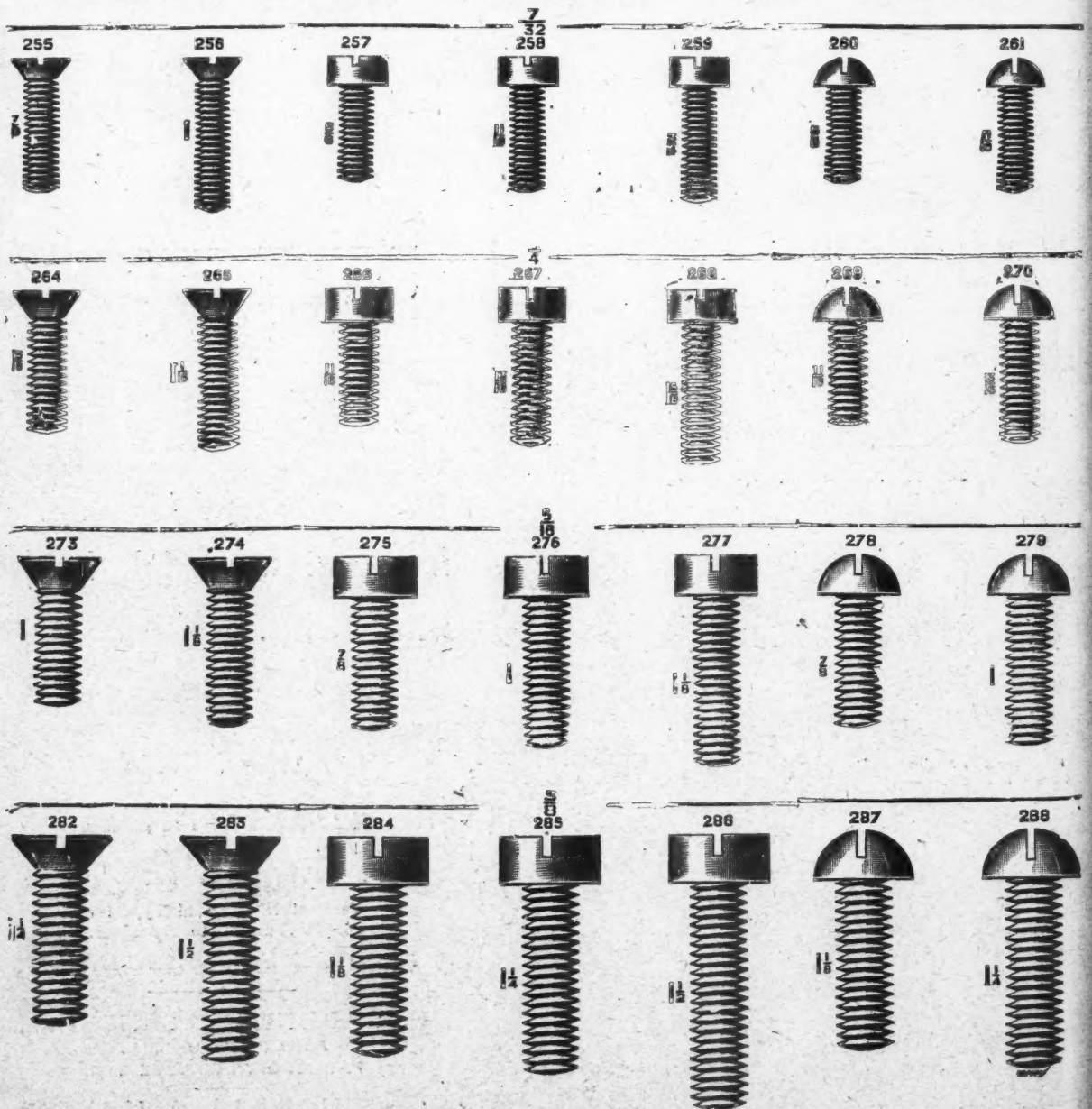

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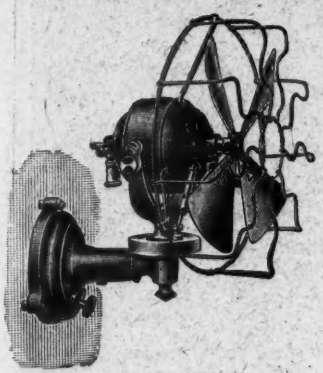

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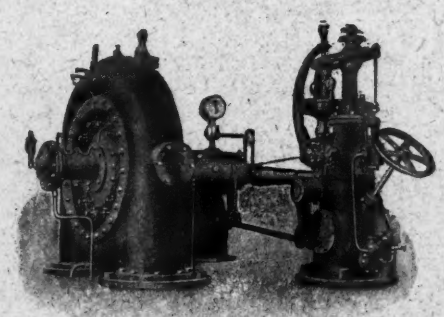

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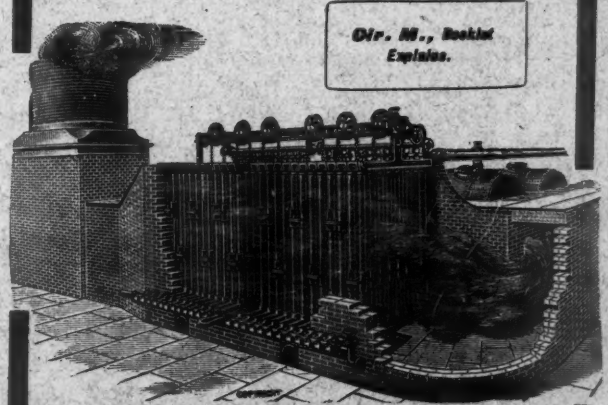

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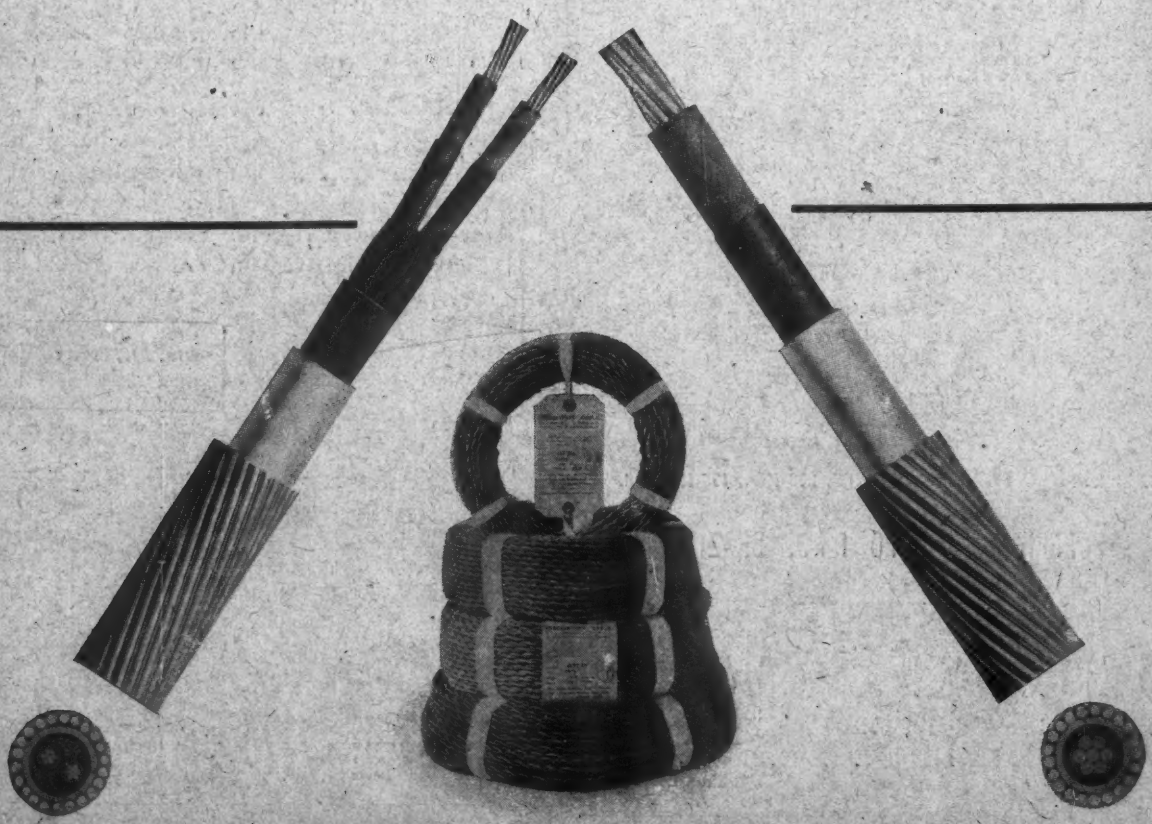
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